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DIACHRONIC HIERARCHIES IN ROMANCE

BY

JOHN MICHAEL LIPSKI

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY
IN
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DEPARTMENT OF ROMANCE LANGUAGES

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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled

DIACHRONIC HIERARCHIES IN ROMANCE

submitted by

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in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Romance Linguistics.

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We do NOT know the past in chronological sequence. It may be convenient to lay it out anesthetized on the table with dates pasted on here and there, but what we know we know by ripples and spirals eddying out from us and from our own time..

Ezra Pound

ABSTRACT

The hierarchical behavior of phonological elements and word positions has long been recognized in the Romance languages, but never studied in detail. As a first step toward a detailed analysis of diachronic phonological strength hierarchies, the behavior of atonic vowels in Italian, Spanish and Portuguese is examined on the basis of a numerical count of instances of loss and modification. The results indicate a strength scale of atonic position and one based on inherent vowel quality. Among word positions, initial pretonic vowels fared best, followed by the internal pretonic, posttonic penult, and intertonic syllables, respectively. Among the vowels, the following descending scale of diachronic strength was observed: /a/, /o/, /e/, /u/, /i/.

The resulting hierarchical structures are further discussed in terms of phonotactic compatibility of consonant clusters which result from loss of a vowel, in order to avoid spurious correlations of diachronic strength. The theory that language change tends to encourage open syllabicity is tested by comparison with the numerical data and the results, while not definitive, due to the small number of cases involved, show no conclusive trend in this direction.

Elementary phonetic measurements suggest that the diachronic hierarchy of positional strength may be based on relative intensity, while inherent vowel length has little or nothing to do with such behavior. No clear acoustical correlates may be found for the inherent differences in diachronic strength among the various vowels.

Word-final vowels generally resisted loss or modification to a greater degree than would be predicted by their physical properties alone. The role of morphological function of final vowels in the Romance languages, with special reference to Catalan, is examined in the light of more general considerations of information content, in an attempt to evaluate claims that morphological function inhibits phonological change. It is concluded that the overall rate of final vowel loss in the Romance languages studied is roughly proportional to the rate of word-internal syncopation, hindered by the morphological function of the final vowels.

The hierarchy of positional strength is further supported by application to the problem of vocalic modifications in the future and conditional forms of Italian first conjugation verbs. Examination of alternative solutions yields the conclusion that the change may be most readily characterized if values of diachronic positional strength are included in the description.

In answer to the question of the place of hierarchies in phonological theory, it is concluded that such hierarchical indices belong at the metatheoretical level, serving as interpretive devices acting on individual rules and feature specifications. Some elementary suggestions are offered concerning the manner by which hierarchies can be made compatible with diachronic rules, and with distinctive feature values.

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CHAPTER ONE
STRENGTH HIERARCHIES IN PHONOLOGICAL THEORY

1.1 The study of hierarchies

A linguist may approach the study of the sounds of human language on more than one level. For example, he may study the physical properties of the sounds themselves, and the vocal gestures required to produce them; this is the level of phonetics. Or, he may observe the manner in which the set of sounds found in any given language behaves as a formal or psychologically motivated pattern; this may be termed the level of phonology.[1] Within either of these two levels, no matter what parameter is used as a measure, it will be found that some units behave differently from others. For example, on the phonetic level, some sounds are more easily perceived through noise than others, some involve greater articulatory energy than others. On the phonological level, some units may represent a wider range of phonetic possibilities than others, and certain pairs of units are more likely to be confused by speakers or listeners than others. Having observed these facts, the linguist may ask whether within any given language there is an internal consistency in the differential behavior of sound-units, and if so, whether any patterns are discernible which are applicable to more than one language, perhaps to all languages.

Investigation of many languages has revealed some sort of cross-language consistency among sound systems and the possible existence of many universal or quasi-universal patterns. Such observations have led to the basic axioms governing the study of phonetics and phonology, and have provided motivation for the concept of distinctive features and broad classifications of sound change like assimilation, lenition, and apocope. Various parameters may be chosen which can be quantitatively measured in each sound unit, whether in a given language or universally. It is generally possible to let a parameter define a scale or hierarchy along which may be placed all the units in question, according to their behavior with respect to this parameter.

Empirical evidence pointing to the existence of hierarchies may be obtained in several ways. A hierarchy may be established on the basis of measurements or observations of the sound-units themselves; for example, a phonetic hierarchy of oral closure, or of amount of glottal vibration, or on the phonological level, of the number of correlations shared with other members of the phonemic system. It is also possible to define hierarchies by means of _indirect_ observations, concerning the manner in which units behave with respect to some other phenomenon or process in the language. The most frequently observed hierarchies obtained by the latter method involve some variation on the notion of 'strength'. 'Strength' used in this sense refers to the tendency of a given sound unit to resist inclusion in a particular phonological process to a greater or lesser extent than other members of the same sound system. Since 'strength' so defined is an abstract term, and since most investigations of strength hierarchies have been based on the behavior of sound units as part of an abstract system, strength values are generally assigned on the phonological level.

The study of phonological strength hierarchies _per se_ was not common in early linguistic works, although many of the fundamental notions were present implicitly, and occasionally explicit statements were offered. More recently, the theory of generative phonology has brought forth a renewed interest in formal patterns, the mathematical structure of language, and the discovery of language-universal properties of speech sounds; consequently, strength hierarchies have also received attention within generative theory. Most recent studies dealing with phonological hierarchies, however, have attempted to establish a number of universal characterizations based on a relatively small amount of data and have paid little attention to the full implications of the incorporation of formal hierarchies into phonological theory.

The goal of establishing phonological universals will only be fully realized by approaching it from the bottom, via a series of empirical investigations with ever broadening scope. However, as noted, for example, by Rebecca Posner (1961: 18): 'The sheer accumulation of examples is surely of little value, unless generalizations are made on the basis of observation'. On the other hand, while a certain amount of intelligent speculation is always valuable in signalling new directions for research or revision, at some point the formal model must be confronted with the actual data, or the whole theory will be useless. The present study represents an attempt to tread the nebulous terrain between only data-gathering and speculation, by focusing on particular phenomena, which in turn lend support to a more general theoretical statement. To this end, Zwicky (1972: 277) has advised:

> A discussion of hierarchies is significant only insofar as the same or similar orderings (or their inverse) reappear at many points in the grammars of many different languages. That is, an argument that a particular hierarchy requires representation in phonological theory will resemble arguments supporting particular choices of features or other notational conventions ... A ramified theory would require

> an account of the relationships and interactions among the various hierarchies, and to be completely satisfying, the tenets of such a theory should have some external justification, for example, in terms of phonetics.

The present investigation seeks to demonstrate the operation of phonological strength hierarchies by comparing a selection of data with other known facts or hypotheses about the workings of language. Since it deals with a highly specific set of data, drawn from the Romance languages, the problem of universality is approached only incidentally. By remaining within a closely related family of languages, any theoretical discussion which may result from empirical observations will not stray too far from concrete reality.

Until recently, remarks concerning the presence and activity of strength hierarchies have been almost exclusively confined to general statements describing the overall structure of a particular language and consequently have never been applied in any detail to specific phenomena. The feasibility of employing the notion of phonological strength hierarchies not only as a descriptive convenience, but also as a tool to be used in characterizing other diachronic developments is explored in this study. Vocalic strength hierarchies, based on word position and intrinsic phonological content are established for the early stages of a number of Romance languages. These hierarchies, common to all the languages under consideration, are isolated on the basis of empirical statistical observations. Once the presence of these hierarchies has been determined, and their interaction with other important diachronic factors assessed, the hierarchies are applied to the description of a particular morphological change in Italian.

1.2 Types of phonological hierarchies

In her study of consonantal dissimilation among the Romance languages, Rebecca Posner (1961: 48) noted that a segment may be ranked in a number of different ways, considered in terms of its overall behavior:

> ... the strength of a consonant can be of three types: intrinsic, i.e. according to its intrinsic phonetic and phonemic features; positional, i.e. according to its position in the word or syllable; historical, i.e. according to its historical tendency to be retained or changed.

A closer examination of these remarks reveals that Posner has not isolated three independent measures of phonological strength, but rather three interlocking aspects of the search for a scale of phonological resistance.

The fundamental dichotomy synchronic-diachronic is applicable to the investigation and description of phonological hierarchies. Segments may be arranged along a scale based on their degree of participation in a synchronic process or alternation, or the scale may be formed on the basis of diachronic developments which selectively affected certain segment types in a manner indicative of a hierarchical ordering. In most instances, diachronic hierarchies are much easier to establish, but there are also synchronic processes of sufficient complexity to permit the inference of a strength scale.[2] In a few rare cases, it is possible to make an instant comparison between synchronic and diachronic hierarchies within the same set of data. For instance, Foley (MSa, 1970a, 1970b, 1972a), on the basis of his study of Romance and Germanic data, remarked that during the process of intervocalic lenition of stops, velars will be lenited first, followed by dentals, and only then by labials, thus defining an implicational scale. These claims have been supported by Zwicky (1972) and to a certain extent by Lass (1971). Izzo (1972: 82-108), in the course of an unrelated study, found Tuscan dialects in which only intervocalic /k/ had been lenited, as well as dialects leniting only intervocalic /k/ and /t/, in addition to Tuscan dialects leniting /k/, /t/ and /p/; in all dialects, spirantization of /k/ occurred more often than spirantization of /t/ and /p/.

The intrinsic phonetic or phonemic strength of a segment, and its positional strength within a word are important factors in both synchronic and diachronic processes, and must therefore be considered concurrently with the time element in any discussion of hierarchies. This investigation is primarily concerned with the role of strength hierarchies in shaping diachronic developments, but given the interrelationship of synchronic and diachronic data, it is impossible to avoid implications for synchronic aspects of the languages under consideration. In order to interpret the historical data, reference will be made to strength hierarchies based both on the intrinsic nature of segments and on position within the word. In the last analysis, a hierarchy is merely a scale formed on the basis of observations of the workings of an entire language, and does not presuppose the exclusive use of a single set of defining characteristics. If a group of segments behaves historically in a manner suggesting the existence of a hierarchy, it is because a similar hierarchy existed in the synchronic dimension of the language throughout the time period in question. The converse, obviously, is not necessarily true, for a synchronic hierarchy is not always the result of a single historical development.

1.3 Hierarchies based on phonetic properties

Virtually every historical grammar contains some implicit reference to the differential and quasi-hierarchical behavior of sounds or word-positions across time. Remarks concerning vocalic hierarchies of positional and intrinsic strength, both synchronic and diachronic, appear in most treatises on Romance linguistics, and in numerous minor works as well. Very few scholars have made explicit reference to hierarchies; the most common practice has been to scatter, throughout the text, a number of comments concerning the relative strength or resistance of certain segment-types or positions. All such remarks are, by virtue of their sporadic and incidental nature, purely descriptive in value, and make no attempt to transcend the description of individual phenomena. Nonetheless, a survey of major works of Romance linguistics reveals a high degree of awareness of the differential behavior of sound elements.

1.3.1. Ranking of vowel timbre. From earliest times, poets, philosophers, and others with a keen ear for language have noted, in the synchronic dimension, differences in 'strength', 'sonority', 'weight', and other impressionistic criteria, among the vowels of the Romance languages. Voltaire, in his *Elémens de la Philosophie de Neuton* (1738), compared the seven colors of the visible spectrum with the length of vocal cord vibrations, thence to the seven intervals of the (Western) major scale, starting with violet at the low end, and progressing to red at the high end; in this fashion, he established an inverse relation between the wavelength of light and the wavelength of sound.[3]

Feliciano de Castillo, in his *Tratado de Metrificação Portuguesa* (1850), offers a number of interesting impressions of the intrinsic characteristics of the Portuguese vowels. Speaking of [a], he notes: 'Esta letra é de todas a mais franca'. The vowel [o] is described as follows: 'O o é na segunda escala das vogais o que o A é na primeira: som franco, rasgado, enérgico, é como uma explosão da alma'. For [e], Castillo notes: 'Com menor volume, com menor explosão e resonância do que o A'. The vowel [u] is 'um som abafado, que se emite com a boca já quase de todo cerrada'. He continues: 'Se a vogal A que nos abriu a primeira escala dos sons, expressa a grandeza e a alegria, o I, em que a mesma escala termina, parece convirá com as ideias de pequenez e tristeza'. Finally, the entire vowel scale is summarized: 'O A é brilhante e arrojado; o E tenue e incerto; o I subtil e triste; o O animoso e forte; o U carrancudo e turvo.'

More recently, Claudine Hunting (1973) has offered some impressions concerning the French vowels:[4]

> Visuellement la bouche prononçant le son A se présente à son point d'aperture le plus grand, n'opposant aucun obstacle à l'émission de la voix qui conserve ainsi toute sa puissance originelle ... la voyelle o est la plus sonore de toutes ... les lèvres se prolongent alors démesurément en un instrument de musique des plus sonores: le clairon. La bouche, ainsi gigantesquement agrandie, résonne bruyamment ... en opposition à la voyelle éclatante qu'est le A, le son E, bouche plus fermée, lèvres légèrement avancées, est à peine perceptible. Il est plus un souffle qu'un cri ... l'atonie du son E correspond bien à celle de la coleur blanche qui est, en fait, absence du toute couleur ... après l'accalmie passagère du E éclate le rire du I ... la forme allongée des lèvres très rapprochées suscite tout d'abord l'ouverture étirée d'une blessure ...

Finally Hunting arrives at the vowel u [y]: 'C'est la voyelle dont la sonorité est la moins forte, mais la puissance de souffle la plus grande, car son énergie se concentre et vient buter contre l'obstacle des lèvres presque fermées'.

Such remarks are prevalent in works on the Romance languages, and form the basis for much of the literature on phonetic symbolism, a domain which also represents a ranking of sounds, in the synchronic dimension.[5] It was not until the Romance languages were subjected to comprehensive linguistic descriptions, however, that any attempt was made to characterize the diachronic behavior of the various vowels.

Mendeloff (1969: 11) neatly summed up the evolution of the atonic vowels, from Vulgar Latin to the Romance languages, in the following statement:

> The evolution of the Vulgar Latin unstressed vowels was influenced by one or more of the following factors: (1) the intensity of stress in the language concerned, (2) the perseverance of the vowel, (3) the presence of contiguous consonants, principally nasals and palatals, (4) the fact that the vowel, through the loss of an intervocalic consonant, found itself in hiatus, (5) assimilation to the stressed vowel, (6) dissimilation from the stressed vowel, (7) position within the word, (8) confusion of initial vowels with vowels of articles and prefixes, (9) the fact that the syllable concerned was checked or unchecked.

Menéndez Pidal (1966: 67) describes the high degree of diachronic strength of the vowel a: 'La vocal a es tan resistente, que aun inacentuada, se conserva en todas las partes de la palabra en que se halla ...

la suerte de las otras vocales átonas está determinada por la resultante de dos condiciones: primera: su colocación respecto del acento; segunda, su colocación en el comienzo, medio, o fin de la palabra'. He also notes (p. 44) that 'en sílaba átona las siete vocales se redujeron a cinco cuando son iniciales de palabra y a tres cuando son finales', thus in effect classifying *a*, *o*, and *e* as the three 'strongest', vowels.

Bourciez (1967: 144) also makes implicit reference to the diachronic strength of *a*:

> L'opposition n'est pas d'ailleurs absolue, car, en Espagne notamment, il est resté un certain nombre de proparoxytons, ainsi ceux dont la voyelle penultième était un *a* ... les voyelles qui, sans être dans la syllabe initiale, se trouvaient devant l'accent, ont eu aussi tendance a s'effacer, à moins qu'un groupe de consonnes ne les protegeât ... leur chute (exception faite pour *a* ...) a été normale au N. de la Gaule.

Grandgent (1934: 98) remarks, of the intertonic vowels: 'In some regions, they began to fall regularly before the close of the Vulgar Latin period, but *a* was generally kept'. Speaking of final vowels, he notes (p. 102): 'The vowels regularly remained throughout the Vulgar Latin period. Later, about the eighth century, they generally fell, except *ă* and *ī*, in Celtic, Aquitanian, and Ligurian territory'.

Guarnerio (1918: 301) describes word-final *a* as follows:

> E la più resistente delle vocali finale e si conserva in tutti i domini romanzi, meno che nel francese, in qualche zona ladina, e in qualche dialetto italiano.

For initial syllable *a*, Guarnerio notes (p. 336): 'Anche nella sillaba iniziale atona, l'A e la più resistente in tutti i domini, e subisce in una misura relativamente debole l'influsso delle consonanti antiche'. The author also remarks on the resistance of *a* in the posttonic syllable (pp. 319-20): 'L'A ... mostra maggior resistenza, cosí nello spagnuolo dove E cade davanti a N, l'A rimane ...'

Lausberg (1956: 96-7) begins one of the most comprehensive statements regarding diachronic ranking of segments by noting that:

> Spricht man alle Laute mit (ungefähr) dem gleichen Atemdruck, so besitzen doch nicht alle den gleichen Schallfüllegrad. In diesem Fall nämlich tritt der Eigen-Schallfüllegrad eines jeden Lautes (d.h. der jedem Laut durch seine spezifischen Eigenschaften zukommende Schallfüllegrad) in Erscheinung.

Lausberg then goes on to classify all the vowels and consonants of the Romance languages along a numerical scale of 'perceptibility'; the vowels *i* and *u* are placed lowest among the vowels, *e* and *o* on the second highest step, and the vowel *a* has the highest degree of 'perceptibility'. A similar statement is offered for Spanish by Navarro Tomás (1971: 27), who ranks the Spanish vowels along a descending scale of 'perceptibility': *a*, *o*, *e*, *i*, *u*. Among the consonants, in Navarro Tomás' study, as in Lausberg's, vibrants are classified as the most perceptible, followed by laterals, nasals, fricatives, and occlusives, in that order.

1.3.2. *Hierarchies of word position*. Generally speaking, among works of Romance linguistics, there has been a higher degree of awareness of hierarchies based on position within the word than of hierarchies of vowel timbre. Nearly all discussions of hierarchies start off by noting that, in Vulgar Latin, the penultimate and intertonic syllables were highly susceptible to loss. Some investigators attempted a classification of atonic positions in greater detail, also taking into account the early stages of the original Romance languages.

Bourciez (1967: 36) notes that 'on peut admettre (avec certaines réserves, surtout pour l'Orient et l'Italie du Sud) qu'au cours de la période impériale le peuple, en parlant, ne faisait plus que rarement entendre la pénultième brève'. He further notes (p. 143) that:

> La force d'expiration donnée à la syllable accentuée devait entraîner une autre conséquence que les fréquentes diphtongaisons: elle ne pouvait en effet se faire sentir qu'au détriment des syllables voisines, dont les voyelles risquaient de disparaître dans la pronunciation. Déjà, à l'époque latine, c'est pour une raison de ce genre (due, surtout, il est vrai, à la nettété particulière de la syllable initiale), que certains proparoxytons étaient dévenues paroxytons.

Grandgent (1934: 91) remarks that 'among stressed vowels, those of the first syllable had most resistance, possibly through a lingering influence of the Old Latin accent'. Of the intertonic, Grandgent notes (p. 98): 'Vowels so situated probably became more and more indistinct towards the end of the empire, and occasionally disappeared'. He also states (p. 99) that 'the Vulgar Latin rhythmic principle tended to obliterate one of the two posttonic syllables of proparoxytones. The penult, being next to the accent, was weaker and more exposed to syncope'. Grandgent (1927: 46) describes the fate of the intertonic syllable: 'In the rhythm of the phrase [the intertonic syllable] has a position not unlike that of a final syllable, and is exposed to similar influences, but, having no inflectional value, its tendency to syncopation is stronger'. He also notes (1927: 56), with regard to the penultimate syllable, that 'here, as in the intertonic syllable, there was a difference between popular and cultivated speech, although the incentive to omission was not so strong in the penult as in the syllable between accents'. Finally, turning to the matter of the secondary stress, Grandgent (1927: 14) remarks that 'when the secondary stress remained, it was apparently stronger in words in which it preceded the main accent than in those in which it followed'.

Elcock (1960: 41) remarks that 'with reference to the syllable structure of the words, it may be observed that nearly all these shifts of accent bear witness to a paroxytonizing tendency in Vulgar Latin'. Essentially the same view is offered by Lapesa (1968: 61): 'En los romances occidentales el ritmo del lenguaje tiende a concentrar la fuerza expiratoria en la vocal acentuada, detrás de la cual no suelen tolerar más de una sílaba'. Speaking of the pretonic vowel, Lapesa remarks (p. 56) that 'en menor grado se debilitó también la vocal protónica, que en algunas regiones, sobre todo en Galia, llegaba a elidirse'.

Menéndez Pidal (1966: 35) offers a good characterization of the inherent weakness of the posttonic penultimate syllable, by noting the behavior of this position with respect to assonance:

> La escasa sonoridad de las vocales postónicas relajadas se aprecia en los asonantes del verso, donde la vocal postónica no cuenta para nada, cualquiera que sea ... la perceptibilidad asonántica de la vocal final es algo mayor, pues sólo son equivalentes las dos vocales palatales entre sí, y las dos velares ... la a final no admite ninguna otra vocal equivalente.

Lausberg (1956: 107) offers the following general remarks:

> Die nichthaupttonigen Silben (und ihre Gipfel) werden mit geringerem Atemdruck ausgesprochen als die Haupttonsilbe. Es gibt dabei verschiedene Druckabstufungsmöglichkeiten ---Je nach der Stellung zum Hauptton unterscheidet man zunächst Vorton- und Nachtonsilben.

He notes (pp. 107-8) that 'die erste (worteinlietende) Vortonsilbe trägt den Nebenton, d.h. sie wird mit dem nächstgrössten Atemdruck gesprochen'. Lausberg adds (p. 108) that 'die Nachtonsilben haben geringen Atemdruck ("unbetonte Silben"), jedoch ist---im Falle des Vorliegens zweier Nachtonsilben---selbst hier noch eine gewisse Abstufung festzustellen'.

In studies in which the differential behavior of atonic positions was described in greater detail, diachronic strength came to be equated with acoustic intensity. Thus, for example, Pope (1934: 112) states:

> Atonic syllables all varied slightly in the amount of stress they received, the weakest being the unstressed penultimate:
> dor-mi-to-ri-um . The final syllables of proparoxytones,
> 2 4 1 5 3
> which were separated from the tonic syllables by the penultimate, received more stress than the final syllables of paroxytones, which followed immediately on the tonic. The value of the intertonic syllables approximated so nearly to that of the final unstressed syllable of paroxytones that they followed, broadly speaking, the same development.

Lausberg (1956: 96) begins his discussion of the fate of various atonic positions with the following statement:

> Das Schallfüllegrad eines Lautes hängt zunächst ab vom Atemdruck, der zu seiner Artikulation aufgeboten wird. Es ist klar, dass ein mit maximalen Atemdruck ausgesprochenes [a] einen grösseren Schallfüllegrad hat als ein mit schwachem Atemdruck hervorgebrachtes oder gar ein geflüstertes [a]. Die Verteilung grösseren oder geringeren Atemdrucks spielt die Hauptrolle in der Wortbetonung.

He further notes (p. 97) that 'die Abfolge der einzelnen Schallfüllegrade im Wort gleicht nun einer Berg-und-Tal-Fahrt; es gibt Schallfüllegipfel und Schallfülletaler'. Finally, Lausberg arrives at his most general statement regarding the fate of the atonic vowels (p. 108):

> Die Verteilung des Atemdrucks auf die einzelnen Silben des Wortes kann sehr extrem sein, d.h. der Hauptton kann äusserst stark hervorgehoben werden, die unbetonten Silben dagegen können dafür mit äusserst schwachem Atemdruck gesprochen werden. Schwachung des Atemdrucks ist Schwachung der Schallfülle, die unbetonten Vokale werden nur noch gehaucht, geflüstert oder angedeutet und schliesslich gänzlich vernachlässigt. Diese Entwicklung ist besonders im Westromanischen verbreitet und besonders früh im Fr. eingetreten ...

1.3.3. Summary. The remarks which have been quoted in this section are by no means exhaustive. Nearly every author of a work on Romance philology has had occasion to mention the topic. The statements chosen for inclusion in this discussion are, however, among the most exemplary, and state in the simplest possible terms the manner in which diachronic strength hierarchies have been viewed by Romance linguists. Within the traditional framework of Romance linguistics, such differential behavior has always been acknowledged, and some investigators have even attempted to establish a causal relationship between diachronic strength and acoustic intensity. All discussions of hierarchical behavior have stopped at this point, however, and no further investigation has been undertaken within the descriptive methodology of Romance linguistics.

The authors cited above have all agreed, either implicitly or explicitly, that certain patterns of diachronic strength may be observed within the Romance languages. Both individual vowels and atonic positions have been tentatively ranked along approximate scales of diachronic resistance. Among the individual vowels, a has been observed to be the 'strongest', followed by o, e, u, and i, respectively. Initial atonic syllables generally appear to have fared best, apparently followed by word-internal pretonic syllables, posttonic penultimate syllables, and the intertonic syllables. In the present study, these scales are amplified and justified by means of comparative statistical data. Many of the conclusions substantiate impressions stated as long as a century ago.

1.4 The position of anti-phonetism

Fundamental to the investigation of phonological hierarchies is the amount of phonetic data to be incorporated into the description. The investigator must determine whether to arrange the segments themselves along a scale defined not in terms of their phonetic properties but in terms of their behavior with respect to phonological processes, or whether to define a metatheoretical index which replaces the actual segments in question. This question may be reformulated as whether phonological hierarchies may be considered properly as distinctive features of phonological theory, or whether they are a system of interpretive devices which act upon, but do not replace, phonetically-defined phonological units. As seen in the preceding section, 'classical' diachronic linguistics, particularly Romance linguistics, has always regarded the ranking of phonological elements in terms of a descriptive convenience, while the elements themselves were characterized by phonetically-motivated distinctive features. Recently, a different interpretation has been offered by Foley, who is of the opinion that strength scales should replace phonetically-based phonological features and hence dominate linguistic theory. He stated (1970a: 88):

> Phonology is not concerned with the physical structure of sounds, but with the relationships that exist between entities that manifest themselves as sounds. To attempt the establishment of a system of phonology on acoustic data is a contravention of this principle ... The distinctive features of phonological systems must be based on phonological, not phonetic data, if that system is to be viable. Acoustics has only peripheral relevance to phonology ... It is possible to construct a system of distinctive features based not on phonetic data but rather on phonological relationships, establishable by observations of phonological change.

Elsewhere (1970b: 11), Foley remarked that phonology conceived in this fashion has no 'physical reality' but only 'systematic reality'; i.e., reality relative to the phonological system which Foley advocates.

An interpretation such as Foley's represents an extreme position, which must be supported by specific information before it can be accepted. In the various papers in which he has presented his theory, Foley has succeeded in demonstrating that segments *can* be represented by distinctive features based on abstract phonological hierarchies, but he has provided no arguments as to why they should be so represented, aside from pronouncements of the sort quoted above.

In a critique of the anti-phonetic position represented by Foley's analyses, Victor Cohen (1971: 316) noted that both syntactic and phonetic facts must be taken into consideration when constructing a level of phonology, which in effect constitutes an intermediate level of representation. By remaining within Foley's system, Cohen notes, 'similarity of phonological elements' could only be determined via a circular procedure referring back to the needs of the phonological system.

In a direct reply, Foley (1972b: 458) remarked that Cohen's criticisms are only applicable to generative phonology, but not to his proposed theory. He further comments that while circularity is a valid criterion for evaluating mathematical proofs, it may not be used to invalidate linguistic theories.

It is obvious from observing developments in the Romance languages and elsewhere that Foley has succeeded in formalizing some actually existing strength hierarchies, but his own arguments designed to show the predictive power contained in such scales must be considered largely circular, since they refer back to the original processes which suggested the existence of a scale in the first place. Whether or not circularity in the system renders it invalid is largely a matter of personal taste, and depends upon the goals which the individual investigator has set for himself.

Foley's main concern in the studies referred to above is theoretical self consistency, together with a maximally general (and hence maximally abstract) formulation; Cohen, in contrast, wants to know how Foley's theory may be equated with specific language data. Cohen voices no objections to the internal consistency of Foley's theories; he does, however, demonstrate some cases which serve as apparent counterexamples to Foley's predictions. Foley (1972b: 460), while recognizing the existence of counterexamples, states that correspondence with data, together with empirical testability and circularity, are not the 'most important' criteria for evaluating a linguistic theory, and asserts that 'a theory cannot be disproved by data, but only by another theory, if at all'.

A word should be added at this point concerning the 'philosophy of science' implicit in Foley's work on phonological hierarchies, which, despite the author's claims to the contrary (1972b: 460), bears little resemblance to other statements with the same title. Foley has claimed that a theory may not be invalidated by a counterexample. This is the converse of the generally accepted scientific methodology, which assumes that no theory can ever be proved (merely successively confirmed) but that a theory must be modified or rejected when faced with a counterexample.[6] If, as Foley claims (1972b: 460), a counterexample cannot invalidate a theory, then presumably nothing can; certainly not another theory, since this theory is also unfalsifiable by counterexample, but only by another theory, and so on, ad infinitum. As to the possibility, mentioned by Foley (1972b: 460), that the data containing a putative counterexample may be incorrect, if these data meet the same standards which the investigator has imposed on the data which confirm his theory, they must be accepted; otherwise no theory will be falsifiable.

Equally incongruous is the notion that circularity does not invalidate a scientific theory. While it is true that the charge of circularity does not disprove the theory, it is also true that a circular theory is empirically useless. The circularity inherent in any particular theoretical proposal may be overcome only if the theory is extended over a wider domain, so that predictions may be hazarded, and the results of these predictions compared with the claims of the theory.

In order to justify an abstract phonological system such as the one proposed by Foley, one would have to demonstrate a set of empirical correlates for the abstract features which could be given some sort of psychological or perceptual reality, and which would hold up to testing better than the presently employed physically determined distinctive features. It is impossible to accept merely on faith claims that features derived from phonological hierarchies should replace ordinary phonetically-based distinctive features. Indeed, some current work in psycholinguistics, for example the experiment reported in Derwing (1973: 318-20), indicates that, while some of the presently used distinctive features may not in fact be perceived as such by the untrained native speaker, the perception of segments is accomplished by superficial processing, and does not necessarily take into account any more abstract phonological patterning than is necessary to effect identification.[7] During a discussion of the feasibility of representing one of Foley's specific examples, Spanish intervocalic lenition, solely by means of a numerical scale, Anttila (1972: 112) remarked that 'even though it is quite possible to use such tricks for presenting shifts as simultaneous jumps, their value as historical indices is highly questionable'. Similarly, the remarks of Zwicky cited earlier show a desire to bolster the theoretical notion of phonological hierarchies with empirical data. Foley, on the other hand, has constructed abstract schemata which may be mapped onto the present theory of phonological structure only by his own interpretive conventions.

Another alternative to Foley's conception of abstract phonological features is to represent the observable strength hierarchies not in the distinctive feature system itself, but in the phonological metatheory.

Viewed in this fashion, such hierarchies would serve as additional interpretations of certain configurations of features, rather than actually replacing them. This is in effect the position adopted by Zwicky (1972) in his discussion of a particular phonological hierarchy in English, and by Lass (1971), who deals with Old English data. For example, Lass (1971: 22) notes:

> It looks as if the feature [± coronal] is crucial to the resistance of dentals to intervocalic lenition; but it is easier to say this than to explain it. At the moment, I am at a loss for a really motivated explanation, but it may be at least possible that coronal articulations have a greater amount of articulatory energy associated with them, due to the raising of the tongue blade above neutral position, and this may make them more resistant to certain kinds of lenition than non-coronals of the same positional class. But this is still an open question.

Lass is clearly searching for an explanation of the correlation between a given hierarchy and the current usage of distinctive features; he is not attempting to substitute the points of the hierarchy for the distinctive features themselves.[8]

1.5 The problem of cause and effect

For the most part, strength hierarchies are discovered by observation of historical events, or by synchronic alternations which either result from, or may lead to, historical events. If the events in question indicate the existence of a hierarchy, one may ask what effect the hierarchy itself may have had on the ensuing events. If, for example, the 'weakest' member of a posited strength scale is observed to undergo lenition or loss, can one attribute the cause of the lenition to the low position on the hierarchy? Such hierarchies are established by observing historical processes, and hence an attribution of causal powers to hierarchies is in this sense circular. On the other hand, there has been a great deal of recent investigation, particularly within the domain of generative phonology, which hints at the possible causal action of formal structures; for example, 'rule simplification' by means of alpha variables, feature suppression, and so forth.[9] Such studies often give the impression of having put the cart before the horse, since the formal conventions upon which they are predicated have generally been derived from observations of similar historical developments. In the particular case of strength hierarchies, knowledge of their existence presupposes previous knowledge of a great number of synchronic and diachronic processes within the same language. It is therefore impossible to set up such a hierarchy as an explanation of a historical process, unless perhaps 'explanation' is defined as 'accounting for particular events by reference to general laws ... of accounting for laws by reference to principles still more general' (Caws 1965: 91). Popper (1959: 59) offers a similar definition: 'To give a causal explanation of an event means to deduce a statement which describes it, using as premises of the deduction one or more universal laws, together with certain singular statements, the initial conditions'. Within the domain of linguistic and literary theory, the same interpretation has been proposed by Tanaka (1972: 41-2):

> Traditionally, the two most important functions of a theory are to provide explanations and make predictions covering particular phenomena ... let us say that when we explain something we

> show how the statement describing the particular phenomenon follows from a more general law-like statement. For example, we would explain why a particular sentence can passivize by showing how it meets the input conditions for the passive-transformation ...

The term 'explanation' as used above does not entail the determination of the underlying causes of a given phenomenon, which lie outside the theory, but only a determination of general statements or laws. Wittgenstein (The Brown Book, p. 88) offers a distinction between 'cause' and 'reason' in seeking theoretical explanations:

> If you ask 'why', do you ask for the cause or for the reason? If for the cause, it is easy enough to think up a physiological or psychological hypothesis which explains this choice under the given conditions. It is the task of the experimental sciences to test such hypotheses. If on the other hand you ask for a reason the answer is 'There need not have been a reason for the choice. A reason is a step preceding the step of the choice. But why should every step be preceded by another one?'

As a further remark along these lines, we may consider the statements of Rapoport (1972) concerning theoretical explanations. Rapoport defines two terms, theoretical explanatory power and explanatory appeal:

> The greater the increase in the a posteriori probability of an event (given the assumptions embodied in the theory) relative to the a priori probability, the greater the explanatory power of the theory. (p. 322)

> It is not necessarily the predictive power of a theory in a single instance which makes the theory acceptable, but rather its 'integrative potential', the extent to which many apparently unrelated events are seen in the light of the theory to be related. We shall call this aspect of a theory its _explanatory_ _appeal_. (p. 324)

As defined by Rapoport, explanatory power is an _objective_ criterion, arrived at by the ability to offer empirical predictions, while explanatory appeal is a _subjective_ criterion, relating a number of phenomena according to the investigator's personal point of view. Both criteria have a place within linguistic investigation.

It is useful to consider the following lament of Bernard Cohen (1972: 401):

> It is, perhaps, paradoxical that despite the abundance of explanatory efforts in sociology, and despite the similarity in the goals of explanation between sociology and other sciences, there are very few satisfactory sociological explanations. Our explanations are unsatisfactory because they do not lead anywhere. They are not useful in the pursuit of further understanding of social phenomena. Most often sociological explanations are _ad_ _hoc_ ideas applied to one particular situation and rarely, if ever, used again. Typically, these interpretations are plausible, certainly possible, and often interesting, but the striking thing is that the ideas which one author uses to explain his observations are rarely encountered again, either in the same author's later work or in the works of other

> sociologists. Furthermore, these explanations seldom generate new research, for they are often untestable, or if they are testable, they are presented without any guidelines which would allow other investigators to apply them to some other situation, study, or phenomenon.

This statement provides a convenient summary of the problems involved in considering theories with only explanatory appeal. While not directed specifically at linguistics, Cohen's remarks find wide applicability in various areas of linguistic research, particularly diachronic problems. As a partial solution to this problem, Cohen suggests (p. 409):

> To make our explanations more useful does not demand that we immediately achieve strictly deductive explanations; it does demand that we strive for them. Even the grossest approximations to strictly deductive explanation which result from striving would immensely enhance the utility of sociological explanations.

These remarks also find a ready place in the methodology of linguistic investigation, and especially as regards the problem of cause and effect in historical linguistics. In the field of diachronic linguistics, it is necessary to consider both formal deductive theories and more traditional approaches, along the lines suggested by Rapoport (1972: 337):

> Ideally, speculative concept-generating theories and rigorous technically competent hypothesis-testing theories should complement each other in the development of social science. I do not join the positivists who demand that every theory must be immediately translatable into testable hypotheses,

> and that every hypothesis is formulated only to be tested and disregarded if found wanting ... concept-generating theories are essential in social science, because social science simply does not have a catalogue of ready-made concepts with which the physical scientist operates in full confidence that his concepts reflect the essential features of the world with which he is concerned.

To a field as full of variables and indeterminacies as diachronic linguistics, these remarks are particularly appropriate. More specifically, when attempting to discuss a notion such as phonological hierarchies, it is important to accept the relevance of both the deductive aspect of the theory, established by rigorous observation, and what Rapoport calls the 'integrative potential' or apparent scope of the theory. While a series of historical events may be shown to be consistent with a proposed hierarchy, this hierarchy may not be said to *explain* the events in question in the sense of accounting for their primary motivation. Instead, the hierarchy must be regarded as an *interpretation* of the process in a fashion which might be related to other developments or phenomena in the same language, or in related languages.

Speaking of the problem of cause and effect in formalized theoretical linguistics, Anttila (1972: 127-8) noted:

> The point of view that changes would first occur in the program, in competence, and only later would change the utterance without having anything to do with performance is clearly inadequate, although popular. This notion is a result of the scoring mechanism for changes. Language is learned and hearers interpret utterances largely from

> performance, that is, real concrete speech situations. Causes have to be sought in the totality of language and the relation of its use with the total culture, and individual speech acts.

On the other hand, Kiparsky (1972: 191-2) has characterized the current state of affairs as follows:

> The bases of explanation in current generative phonology are formal constraints given jointly by the notational conventions and the evaluation measure. These formal constraints may be absolute or relative. Absolute constraints are given by the interplay of the notational devices and the evaluation measure.

Given such a procedure, it is virtually impossible to formulate the cause of a historical process or event in terms of formal notational devices, since these devices are themselves outside the empirical limits of phonology, and belong instead to the domain of mathematical metatheory.

As visualized in the present investigation, the study of hierarchies is not the study of causes, but of relations. It is impossible to determine with any degree of certainty the cause of any sound change. One can hope to accomplish an enumeration and systematization of factors which aided, or equivalently, which impeded, a given sound change. While it seems unfeasible to seek causes for sound changes, the investigator may at least hope to gain a further insight into the structure of the factors surrounding such changes, and to ultimately arrive at a theory of the conduction of sound changes. In the long run, this latter line of inquiry may turn out to be the more productive, and of greater value to the study of linguistic evolution, since while the actual inception of any sound change is probably sporadic and random, the course eventually taken by the change may be accounted for by a theoretical model. By looking to the past, in formulating a theory of historical phonology, one may also hope to look to the future; for, given sufficient data upon which to base a theory, it should be possible to hazard predictions as to the direction of future developments in a given language, with better than random probability.

From a more epistemological point of view, the introduction of the notion of phonological hierarchies may be regarded as a form of reduction of part of the theory of sound change. The following characterization of reduction is offered by Causey (1972b: 176):[10]

> Occasionally, one scientific theory T_2 is explained by another theory T_1. When such an explanation satisfies certain conditions, it is usually said to provide a reduction of T_2 to T_1 ... I use the term 'theory' here in a broad sense to denote a set of laws or putative laws which may be either well-confirmed or merely hypothesized. In addition, I will assume that T_1 and T_2 are concerned with objects in the domains $\underline{Dom}_1$ and $\underline{Dom}_2$, respectively ... I will say that a microreduction of T_2 to T_1 is a reduction of T_2 to T_1 in which the elements of $\underline{Dom}_2$ are identified with certain elements of $\underline{Dom}_1$. It is further assumed that $\underline{Dom}_1$ always contains a set of basic elements, which from the point of view of T_1 are not structured wholes. In addition, $\underline{Dom}_1$ may contain compound elements which are structured wholes whose parts are basic elements. Thus, depending on the particular

> microreduction and the particular elements, an element in $\underline{\mathrm{Dom}}_2$ may be identified with either a basic or with a compound element of $\underline{\mathrm{Dom}}_1$.

In order to apply these remarks to linguistic theories, it is necessary to construe the term 'explanation' in the light of the preceding observations. While it is beyond the scope of this study to determine the full epistemological significance of Causey's remarks to linguistic theories, it is easy to see that, at least from a heuristic point of view, a theory of phonological hierarchies may conceivably serve as a reduction (and even a microreduction) of a more general theory of phonological change. The theory of hierarchies deals with a domain consisting of metatheoretical statements about phonological structure. The elements of the domain of a theory of phonological change may consequently be ultimately reduced to a metatheoretical level stated in terms of hierarchies. Use of the term 'reduction' in this sense is not meant to imply that the phonological strength scales are to replace the actual phonological values; in fact, the opposite conclusion is implicit in the preceding paragraphs. It is possible, however, to place the sort of methodology involved in the postulation of phonological hierarchies in a somewhat broader perspective, by viewing the entire process as a theoretical reduction. Overriding any theory is a level of metatheory, and the extent to which the metatheory intervenes in the application of the theory varies considerably. The precise relationship between theory and metatheory also varies, and it is the failure to clarify this relationship which has led to a great deal of criticism of certain linguistic theories.[11] It is the intent of this investigation to maintain a clear boundary between the metatheoretical level, exemplified by the hierarchical indices, and the level of linguistic structures. As mentioned previously, hierarchies must be regarded as performing only an interpretive function; in this sense, then, one may speak of a theoretical reduction.

In conclusion, this study is not directed toward the search for causal explanations in diachronic phonology; what is sought after instead is an explicit portrayal of the structure inherent in certain types of change. An accumulation of such data may then be utilized to further extend the search for explanation in linguistics.

1.6 Data for the theory

Phonological hierarchies, by definition, may be either language-specific or universal in nature. Often, a hierarchy will emerge upon consideration of a single historical event, and is not applicable beyond the study of this or similar events; thus, for example, the caution of Lass (1971: 26), following his proposed strength hierarchy:

> ... the schema I am proposing here is intended to be a possible universal characterization only for intervocalic lenition, not other kinds. Each basic assimilatory type will presumably have a specific schema associated with it.

On the other hand, observations have been made which suggest that certain phonological hierarchies are universal or quasi-universal in nature; that is, they are a function of the human species, and do not result from the peculiarities of any particular language. The search for universal hierarchies must encompass a vast amount of data of every sort, and to this end, the problem may be approached from a variety of angles. First of all, it is possible to undertake a comparative examination of the phonological systems of all known languages, and search for any significant recurring tendencies. The nearest this goal has ever come to realization is the study of Trubetzkoy (1939), where it may been seen that, while certain phonological system-types are more common than others, it is nearly impossible to offer any non-trivial generalization which will hold for all, or even the majority, of the world's languages. Among the trivial observations is the fact that all languages exhibit the vowel-consonant dichotomy, thus suggesting this as the fundamental phonological axis.[12]

A study of putative universal change-types is also fraught with many of the same difficulties encountered in the search for universal phonological systems, and no truly comprehensive attempt has ever been undertaken. Referring back to synchronic observations of phonological systems, the theory of 'markedness' has been proposed to characterize phonological change. Utilizing these theoretical proposals, a number of attempts have been undertaken to sort out the most 'typical' or 'universal' types of sound change. Some investigators have even sought after physiological correlates of certain change-types; for example, Chin-Wu Kim (1971: 26-38) presents some interesting neurological data which suggest that intervocalic lenition and terminal devoicing may result from optimal neuronal firing sequences.

Observing phonological hierarchies via historical processes is generally a straightforward enough task, but searching for universal hierarchies on the same basis has so far been undertaken only on a very restricted scale. Lausberg (1956: 96-7) and Navarro Tomás (1971: 27) have offered a scale of 'perceptibility' in which all the vowels and consonants of the Romance languages were ranked, with results similar to those to be reported in the following chapters. A similar attempt was offered by Chin-Wu Kim (1966, 1968, 1970), who attempts to define a scalar feature of aperture, with results essentially the same as Lausberg and Navarro Tomás. Foley has, in several places,[13] attempted to define a scale of resonance, with vowels being the most resonant, followed by glides, liquids, nasals, fricatives, affricates, and stops, in that order.

Some of the more salient difficulties with Kim's proposals may be seen in the paper of Lass (1971: 17), who has noted some discrepancies with his Old English data. Lass defines a scale of 'strength' (i.e. resistance to lenition) which is identical to those proposed by Lausberg, Kim, Navarro Tomás, and Foley. Later (p. 24), considering the aberrant results of Old English lenition, Lass notes:

> This suggests that the simple hierarchy ... is not really adequate; at least the movement of segment types down the scale is not regular, since voiced stops drop two positions (from strength 3 to strength 1) while voiceless fricatives drop only one (strength 2 to strength 1) and voiceless stops do not drop at all ... Now let us see if we can formalize these conditions more accurately, specifically in terms of strength hierarchies. It seems, on the basis of the evidence, that it is incorrect to say that descent down the scale is simply linear; it looks as if what we want is something to the effect that the first stage of lenition is voicing, so that a segment goes to the nearest voiced segment type below it in the hierarchy. I suggest that the process of intervocalic lenition is best handled by positing two hierarchies, one for voiceless segments and one for voiced ones, which cross-classify.

Lass then attempts to bolster these remarks by noting possible explanations based on articulatory phonetics. His statements indicate the degree of difficulty which is involved in any search for universal hierarchies; Lass is caught in a dilemma between an intuitively satisfying hierarchy, which has been observed to function in other languages, and a set of data which do not conform to this hierarchy. In the above quote, Lass was forced to recommend a modification of the proposed hierarchical structure. Elsewhere (1971: 22-3), when discussing Old English data which do not support the hypotheses of Foley and Zwicky regarding hierarchization according to point of articulation, Lass proposes that lenition and deletion be considered as completely distinct processes, with the strength hierarchies applying only to the former.[14]

More recently, the problem of phonological hierarchies has been approached by Vennemann and Ladefoged (1973), who offer a distinction between phonological primitives and phonological cover features: '... an adequate phonological description of a language must be expressed in terms of two kinds of features. Any empirical theory has to have a number of primitives which are definable in terms of concepts which belong outside the theory. In the case of phonological theory, these are the prime features, which are definable in terms of the acoustic or physiological properties of sounds. Each of these features consists of a single measurable property of a kind such that sounds can be said to have this property to a greater or lesser degree. In addition, there are phonological features that are not themselves prime features but are disjunctions of values of prime features; we will call these features cover features ...' (p. 61). The authors then consider the manner in which this distinction may be incorporated into current generative phonological theory. Two logical possibilities present themselves. First, one may 'treat both the prime and cover features indiscriminately as "distinctive features", by cross-classifying all segments containing prime features which enter into the definition of specific cover features' (p. 67). The disadvantages of this approach are (at least) twofold:

> (1) By erasing the distinction between prime and cover phonological features, it would obscure a differentiation based on a well-defined phonetic criterion, namely the presence vs absence of a uniform measurable phonetic property. (2) By treating prime and cover phonological features as primitive concepts of phonological theory, it would increase the number of primes of this theory, which is undesirable on general methodological grounds. (p. 68)

The alternative solution is to define cover phonological features in terms of prime phonological features. The authors opt for the latter alternative since it avoids the methodological disadvantages signalled above. In particular, maintaining a distinction between these two types of phonological features permits distinguishing between a level of phonology in which units are determined by phonetically-motivated features and a derived or metaphonological level characterized by the use of cover features such as phonological strength. Ladefoged and Vennemann (1973: 68-69) specifically note the applicability of their distinction to the problem of strength hierarchies, adding that 'the situation with respect to a cover feature such as Strength is slightly more complicated, both because this is a multi-valued cover feature, and because different languages employ different strength hierarchies'. Rather than elaborating on this problem, the authors offer as an example a reformulation of the consonantal strength hierarchy of stops, fricatives, and approximants, utilizing a set of redundancy rules.

As a final observation preliminary to the detailed study of phonological hierarchies, one may note the work done in language ontogeny and language pathology with an eye toward establishing 'universal' hierarchies of language development. The first linguist to coherently suggest the study of these two domains as a source of information on language universals was Roman Jakobson (1941) who, based largely on the findings of Grégoire (1937) and various Russian observers, including the neurologist Luria, suggested an intimate link between child language, aphasic disorders, and universal aspects of phonological theory. He noted, for example, that children tended to learn the phonemes of their language in a particular order, suggestive of a universal hierarchy of 'acquisitional difficulty', and proposed that these observations be linked to other investigations of phonological universals in the hopes that significant correlations might be found. Jakobson also suggested that the dissolution of speech in aphasia followed the mirror-image course of language acquisition, with the phonemes which were acquired last being the first to disappear, and so forth.[15] Jakobson's original observations and speculations have subsequently been subjected to a great deal of serious inquiry, carried out within a number of different disciplines, and the emergent results have been no less diverse. In general, it appears that there do in fact exist hierarchies governing the acquisition and loss of phonological systems, but these hierarchies are not as rigid and unyielding as was originally proposed by Jakobson.[16]

1.7 Scope of the present study

The remainder of this investigation represents an attempt to demonstrate the possible role of diachronic strength hierarchies in characterizing sound change. It is divided into two major parts. The first part, consisting of Chapters Two through Four, contains the data establishing the existence of hierarchies of vocalic strength and word position in the early stages of three Romance languages. A selected corpus of etymologies is used to yield data regarding the rate of loss of vowels in the various atonic positions characterizing the languages being studied. The computations of rate of loss result in the establishment of a phonological hierarchy of atonic positions and a hierarchy of intrinsic vocalic strength for each language. A comparison of the hierarchies isolated for the languages is then used to provide information about more general strength hierarchies common to a larger segment of the Romance languages.

Chapter Two opens the discussion of the search for a rigorous formulation of phonological hierarchies, and presents the results of statistical analyses of Italian, Spanish and Portuguese. In Chapter Three, the phonological strength hierarchies are discussed in terms of the phonotactic compatability of resultant consonant clusters, in order to view the interaction between the two major diachronic forces of phonological strength and phonotactic admissibility. Chapter Four discusses the fate of final atonic vowels, with special reference to Catalan, where loss of final vowels was much more frequent than in Spanish, Italian or Portuguese. The fate of final vowels is evaluated in the light of their posited morphological function as the marker of number and/or gender.

Chapter Five contains the essence of the second major part of this investigation. The strength hierarchies which have been isolated are applied to a particular change in the Italian verbal system, in order to demonstrate the feasibility of employing hierarchies as a tool in diachronic investigations. The results are summarized in Chapter Six, where several suggestions are offered concerning the manner in which strength hierarchies may be incorporated into diachronic linguistics.

Notes to Chapter One

1 Among linguists there is no unanimous agreement as to precisely what constitutes a 'phoneme', and consequently the terms 'phonetics' and 'phonology' taken out of context are vague and ambiguous. Strictly speaking, any abstraction away from physically measurable properties may be considered to represent a level of phonology. In the present study, the term 'phonetic' is reserved for such physically measurable properties of sound units, while any classificatory property serving to include a sound unit as part of the overall sound system of a language is qualified as 'phonological'. In particular, the idea of a 'phonological hierarchy' refers to the observed tendency for sound unit tokens to consistently behave in a hierarchical manner, while the actual motivation for such behavior is presumably to be found in the 'phonetic' properties of the individual tokens.

2 For example, the study of Zwicky (1972), in which modern English data are used to postulate a hierarchy of consonantal strength, and the study of Thelin (1971), establishing a synchronic vowel scale for modern Russian.

3 For further remarks, cf. Jakobson (1941: 82-4), Reichard, Jakobson and Werth (1949), Osgood (1960) and Coenen (1965). Some interesting, if methodologically worthless, remarks concerning the relationship between the vowel scale and the visible spectrum are offered by Schmidt (1947, 1955). Schmidt's works, despite their nonsensical character, indicate the potential relationships which may be established by the untrained observer.

4 Subsequently, Braun (1974) pointed out the relationship between Hunting's remarks and the French 'vowel triangle'.

5 The literature on phonetic symbolism is enormous, and much of the relevant material has been collected by Fónagy (1963). A sample of other relevant studies includes the following, where the potential ranking of vowels along a subjective scale is mentioned: Jespersen (1922: 402-3), Sapir (1929), Newman (1933), Jakobson (1941), Bally (1951: 54-5), Maltzman *et*. *al*. (1956), Chatman (1957, 1967), Hockett (1958: 295-6), Wertheimer (1958), Cressot (1959: 19), Marchand (1959), Miron (1961), Taylor (1963, 1967), Johnson *et*. *al*. (1964), Weiss (1963, 1964, 1966, 1968), Gebels (1969), Chatman (1957, 1967), Brown (1958), Brown *et*. *al*. (1955), Brown and Nuttall (1959), Critchley (1970: 101), Wescott (1971), Michelena (1972). Further references are given in Robinson (1972: 137, fn.) and Melhem (1973).

6 See, for example, Popper (1959: 76), Caws (1965: 182). A more lengthy discussion is found in Derwing (1973: 225-47). Consider, for example, the following remarks of Rapoport (1972) *à propos* the role of counterexamples in formal scientific theories:

> The phenomenal success of physical science has been attributed (justly, I believe) to the physicist's preference of explanatory power over explanatory appeal as a criterion for accepting a theory. In the physical sciences verification of predictions is the 'final court of appeal', as it were. Whenever the derived consequences of a theory result in predictions that consistently fail to be corroborated, the theory is modified or discarded. Thus, a 'feedback circuit' is established between theory and experiment, between logical deduction and observed fact. The process propels theories toward greater generality and precision. (p. 327)

> If observations fail to corroborate the consequences, the model is thereby refuted. But if the consequences are corroborated, the model is not thereby 'proved' to be a representation of reality; it only acquires more credence. We can then contrive to use it, drawing *additional* consequences from it (if we can) thus putting it to more and more severe tests, perhaps modifying or generalizing it in the process. This is the 'feedback circuit' mentioned earlier. (p. 329)

Rapoport's statement represents a succinct appraisal of the role of counterexamples in scientific theories; their disconfirmatory action is clearly indicated. In his reply to Cohen, Foley claimed that his own opinions mirror those commonly associated with the philosophy of science. Foley's position, however, is radically different from that to be found in the empirical sciences when it comes to the question of the role of counterexamples. As a further example, Popper (1959: 113) notes that: 'Theoretical science aims, precisely, at obtaining theories which are easily falsifiable ... it aims at restricting the range of permitted events to a minimum; and, if this can be done at all, to such a degree that any further restriction would lead to an actual empirical falsification of the theory'.

7 Cf. also Ramasubramanian and Thosar (1973).

8 Consider, on the other hand, the statement of Foley (1972a: 97), after having established a lenition 'strength scale' with velars being weakest, followed by dentals, and then by labials:

> It is important to emphasize that this scale does not refer to the phonetic properties of the segments but to abstract phonological relationships. Since our goal is the study of the human psyche of which language is one manifestation (along with behavior and mythopoesis), we surely want to construct our linguistic system in a manner which will allow correspondences to be established with other psychic systems. A phonological theory which includes a set of distinctive features based on phonetic data, because of its parochialism, its inapplicability to other fields, will not allow us to reach this goal.

Once again, as in the passages cited earlier, it appears that Foley has lost sight of precisely what the 'distinctive' of 'distinctive features' is supposed to signify. The very choice of terms indicates the fundamental desire to seek out the basic psychological correlates of phonological theory, and this search must in turn be guided by those aspects of language which can be demonstrated to enjoy psychological prominence in the minds of speakers. It is quite unlikely, for example, that a speaker will consider the difference between two phonemes to be a reflection of their relative resistence to lenition over a period of time; rather, such strength scales are generally observable only by the trained linguist, whose job it is to determine the correlation between such hierarchies and the psychological and physiological characteristics of language. To define a language in terms of the abstract hierarchies which arise from the language is to evade the task of determining the abstract structure of language as separate from the concrete. As a consequence, unless subsequent testing affirms that abstract features of the sort suggested by Foley are in fact 'distinctive' features in the narrowest sense of the term, any investigation of phonological hierarchies should work on the premise that such hierarchies are merely a metatheoretical interpretation placed upon phonological data. In the case of hierarchies based upon position within the word, this conclusion is hard to avoid, since at present there is no indication that speakers respond to word-internal environments in a manner suggestive of distinctive features. The following remarks of Martinet (1966: 13) are of great relevance to the case at hand, albeit in an indirect fashion:

> The model is not the structure, for the structure is always in the object, latent as it were but only if latent is not opposed to real. The best that can be expected of a model is that it represent the structure exactly, and it will do so if the scholar has succeeded in correctly disentangling the latencies involved and has not tried to force them into a prefabricated model founded on the set of a priori ideas currently in fashion.

9 For an example of this type of interpretation, see King (1969a). The value of this analysis is questioned by Newton (1972b), among others. For further examples and discussion, see Harms (1967), Chafe (1968), Wang (1968), Cairns (1969), Davison (1971), Naro (1971b), Andersen (1972), Haiman (1972), Shapiro (1972), Vennemann (1972), and Chen (1973). Some counterarguments to this line of approach are

offered by Creore (1971).

10 Cf. also Causey (1972a) for further elaboration.

11 Perhaps the most obvious metatheoretical bone of contention is the competence-performance distinction. For a thorough discussion of this issue, see Derwing (1973: Chap. 8). Among the numerous other works treating this same theme, some interesting remarks are offered by Reichling (1961), Hammarström (1971), and Pylyshyn (1973). Other metatheoretical questions, especially the notion of 'simplicity' in phonological theory, emerge from the debate between Householder (1965, 1966) and Chomsky and Halle (1965).

12 Even this statement has been disputed. For example, Kuipers (1968), based on data from Indo-European, has concluded that consonants take phonological precedence over vowels, from the standpoint of a universal hierarchization.

13 For example, Foley (1972a: 97).

14 T. Priestly informs me that contemporary (standard) Russian exhibits an analogous phenomenon in fast colloquial speech, where deletion of consonants is quite frequent, while lenition is rare.

15 The correlation between child language and aphasic speech has been experimentally disconfirmed in several cases reported by Fry (1959). On the other hand, Alajouanine (1956) cited other data in favor of Jakobson's proposals.

16 For data pertaining to the phonological hierarchization of child language, one may consult Messer (1967), Menyuk (1968, 1971: 54-91), McNeill (1970: 130-41), and Ferguson and Farwell (1973). Studies on

the phonology of aphasic language are given in Shankweiler and Harris (1966), Blumstein (1970), Pilch and Hemmer (1970) and Schnitzer (1973). Further evidence from experimental psycholinguistics, although restricted to English, is reported in Wickelgren (1965, 1966). The problem is also discussed, from a somewhat different perspective, by Fromkin (1971).

CHAPTER TWO
HIERARCHIES OF DIACHRONIC STRENGTH

2.1 Introduction

When postulating the action of a historical process, the linguist may look at successive stages of the same form, and write an equation which summarizes the essential changes which have occurred. Fundamental to such an equation is the assumption that the events in question proceeded uniformly, with no intervening reverse developments, unless otherwise indicated.[1] For instance, given a form A ending in a consonant, and given the reflex A' of the same form several centuries later, in which the final consonant is no longer present, one must assume that the consonant was simply dropped, perhaps after first being phonetically weakened in some plausible fashion. It is not feasible to assume, for example, that between the time of form A and the time of its reflex A' the final consonant was successively geminated, aspirated, nasalized, and finally lost, since no such intermediate stages are attested, nor may they be posited through parallel developments in the language. If in fact any or all of these changes did affect the original form, the results posited by the linguist are inexact. However, this basic indeterminacy must remain, and may only be attenuated by amassing a large amount of data concerning the nature of plausible phonological processes occurring in the particular language under discussion, as well as more nearly universal phonological change-types; the indeterminacy may then be qualified by a statement of probability or likelihood.

The present investigation treats only the observable data from the history of a subset of the Romance languages, qualified by the general methodology of historical Romance linguistics, and hence all reported results must be weighed in the light of the caution stated above. This limitation is common to all of historical linguistics; nonetheless, since it is a common practice to base theoretical claims on the results of such historical records, the shortcomings of these theoretical foundations must be admitted.

A further methodological assumption which is the common property of most historical linguistic studies is that whenever two groups of forms are related in a manner which may be expressed as a single diachronic equation, a single diachronic process must be posited, by application of 'Occam's razor'. This assumption leads to an even greater indeterminacy than does the preceding one, since it is not unheard of for a language to arrive at the same results through different processes, either in an apparently principled fashion or as the result of the fortuitous overlapping of diverse processes.[2] Here again, however, the indeterminacy is unavoidable, for unless it can be demonstrated that more than a single process was at work to produce a given result, 'factoring through' by the common phonological development is the only non-arbitrary method of assessing diachronic data. In the results reported below, as well as in the following chapters, all the data were evaluated in terms of the methodological assumptions just stated. Since the events in question occurred many centuries ago, it is nearly impossible to sharpen the results any finer, due to the lack of adequate documentary evidence. On the other hand, by converging on the problem from a number of different directions, a plausible case may be constructed.

2.2 Hierarchies in Italian

2.2.1. The choice of Italian. Italian was chosen as one of the target languages for this investigation for several important methodological reasons. First of all, Italian is sufficiently documented to warrant some claims as to the nature of its phonological history. Moreover, Italian has not evolved as far from Latin as have most of the other Romance languages, with the result that observations arrived at on the basis of older written records may often be compared with modern Italian, with a reasonable assurance of convergent results. In addition to a more restricted phonological evolution, Italian exhibits a relatively small amount of external influence, such as borrowing, substrata, or other processes which blur the traces of past events.[3] For these reasons, an investigation of phonological hierarchies in Italian will hopefully provide a solid foundation from which other similar studies in other languages may be launched.

2.2.2. Scope of the problem. Throughout the history of Italian, as in the other Romance languages, there has been a differential treatment of vowels, based upon position within the word. By and large, the Vulgar Latin stressed vowel survived intact, unless modified by a process such as diphthongization or metaphony. Substantially the same result holds true for vowels bearing the secondary stress, for these too remained unmodified in nearly all cases.[4] In the case of the atonic vowels, however, a variety of events occurred, including raising, reduction, replacement, and loss. Furthermore, scholars in the Romance field have traditionally recognized that, even among the class of unstressed vowels, some positions were more prone to modification or effacement than others. Nearly every manual of Romance philology contains an account of the 'strength' or 'weakness' of vowels in different positions within the word. In addition to the general statements quoted in the preceding chapter, a description directed specifically at Italian was offered by Meyer-Lübke (1967: 55f.) who proposed the following set of terms to cover the various positions:

cantò - protonica atona
canterò - protonica semiatona
canta - postonica atona
cantano - postonica semiatona
canterò - semipostonica
cantano - semiprotonica

A similar, although less complete statement, may be found in Grandgent (1927).

The manner in which atonic environments have been classified in itself implies the existence of intrinsic differences, hinting that certain positions are somehow 'stronger' than others. Meyer-Lübke (1967: 55) states further:

> Le vocali atone sono di differenti specie. Anzitutto alcune si trovano prima dell'accento: cantò, altre dopo l'accento: cánto. Ma l'a di cantò non è identica a quella di canterò, perche la prima è affatto senz'accento, e la seconda porta veramente un accento secondario.

This and analogous statements which may be found throughout the literature suggest the possibility of arranging the atonic environments of Italian along a hierarchical scale of 'strength', 'accentuation', or some similar parameter. In order to postulate the existence of a well-defined diachronic hierarchy, however, it is necessary to demonstrate not only a differential treatment of atonic environments in Italian, but also a set of behavior patterns which are consistent enough to warrant inclusion in a step-by-step hierarchical arrangement. Precisely this second demonstration has been lacking in traditional historical grammars of Italian, where one finds instead a random array of anecdotal evidence, by means of which the authors then attempt to infer the existence of a diachronic hierarchy.

Even considerations from a narrow perspective have not yielded unanimity of results, for variation still remains after the common core of observations has been collected. For example, the category names chosen by Meyer-Lübke imply a differential treatment for initial and final atonic vowels depending upon distance from the main word stress, an implication which has not been justified or substantiated either in Meyer-Lübke's works or elsewhere. Furthermore, the degree of constancy suggested by the remarks of Meyer-Lübke, Grandgent, Lausberg, and others has never been empirically justified. In order to remedy these methodological deficiencies, a comprehensive survey of a large sample of phonological processes affecting the Italian atonic vowels was undertaken, to convert the notion of hierarchical behavior from a series of scattered remarks to a more coherent statement.

In view of the available documentation on the Romance languages, measuring the phonological strength in terms of weakening of vowels is the only feasible method which presents itself. In general, loss or raising of vowels may be considered to be evidence of phonological weakening. The replacement of one vowel by another vowel, not a simple raised variant, is sometimes also related to phonological strength, indicating the hierarchical interplay of distinctive features; for example, labialization before labial consonants (devēre > dovere). More often, such replacements are the result of analogical or morphological contamination, and hence do not bear directly on the matter of phonological hierarchies. In order, therefore, to determine the extent to which phonological hierarchies have operated throughout the history of Italian, a statistical survey of the evolution of Italian forms from Latin was conducted, which was then compared with more indirect observations from later stages of the language. The observations of key importance in this regard are the instances of loss or raising of unstressed vowels, as compared with cases of their retention in unmodified form.

Since final atonic vowels in Italian have generally been preserved intact, no useful results may be obtained by studying their behavior; from a phonological point of view they must be considered as essentially of the same 'strength' as vowels bearing the primary and secondary stress. However, a more detailed study of the behavior of final vowels may reveal the relationship between their morphological function and the general process of unstressed vowel weakening (cf. Chapter Four).

2.2.3 Selecting the corpus

2.2.3.1. Introduction. In order to attempt a statistical analysis of vowel weakening in the languages under discussion, the data must be drawn from an adequate corpus. Such a corpus must be representative of the entire language, without giving preference to any particular forms or developments. At the same time, it must be of manageable proportions, consisting of an acceptable sample of the entirety of the phonological history of the languages being studied. In addition, all data regarding specific phonological developments must be well documented and as uncontroversial as possible.

2.2.3.2. The REW. Since the required corpus should be relatively small, easily obtainable, and fairly representative of the whole language, it seemed most feasible to utilize some sort of etymological dictionary. As the direction of evolution proceeded from Latin to Italian, a dictionary giving primary emphasis to the Latin base forms was regarded as most suited to the task of establishing the evolutionary patterns. The volume most appropriate for such an investigation is Meyer-Lübke's Romanisches etymologisches Wörterbuch.[5]

The limitations of the REW are obvious to any investigator who has ever utilized the volume. Perhaps the most penetrating analysis of the shortcomings of Meyer-Lübke's scholarship in general, and of the REW in particular, is offered by Iordan-Orr (1970: 22-3):

> The strength of Meyer-Lübke, for the period between 1885 and 1905, and, be it said, his weakness for the present generation, lies in the very fact that he espoused with such ardour and conviction the neo-grammarian doctrine, applying it regularly and consistently, not only at the beginning of his scientific work, but right to the end. It was characteristic of his attitude with regard to linguistic problems that he should identify himself with the theories of Gröber regarding the reconstruction of Vulgar Latin by a comparison of the Romance languages ... Meyer-Lübke attributes, to all sources of our knowledge of popular Latin, other than the comparison of the Romance languages themselves, very scanty significance, and maintains with conviction

> that in cases of conflicting evidence, credence should be given only to the latter ... His works ... are full of linguistic material obtained by this method. As an example, we may quote, primarily, his Romanisches etymologisches Wörterbuch ...

As a consequence of Meyer-Lübke's methodology, the volume contains a number of dubious etymologies which may be contested on various grounds. Moreover, Meyer-Lübke was not interested in listing the time period in which the cited evolutions ensued; he merely listed the before-after correspondences, generally without stating his sources.

Most of the inherent drawbacks of the REW are generic in nature and may not be categorically eliminated. Instead, individual cases must be scrutinized, and a composite statement compiled. On the other hand, any tendency towards biasing the results in the direction of particular developments or word-classes can in principle be eliminated categorically, by establishing a procedure of random selectivity. In gathering the data from Italian, one word was selected from each of the pages of the REW, thus yielding a sample of 814 words. The randomness was achieved by first establishing a set of categories which would have to be excluded on methodological grounds, and then picking the first word on each page which met all the criteria of acceptability. In the event that a page contained no acceptable words, two words were drawn from the following page. In such cases, the first word was obtained by starting at the top of the page, while the second word was obtained by working up from the bottom, thus minimizing any bias which might be introduced as the result of including derived forms occurring in close succession in the REW. If three or more words had to be drawn from a single page, the sampling alternated between the top and the bottom of the page, thus ensuring maximum diversity of entries. This procedure necessitated inspection of most of the REW's entries, resulting in a reasonably comprehensive overview of the phonological development of Italian as recorded in this volume.

2.2.3.3. Eliminated forms. In drawing the sample from the REW, the following classes of forms were excluded:

1.) Forms showing no reflexes in standard Italian (Tuscan).
2.) Non-Latin words.
3.) Words formed with productive suffixes or prefixes.
4.) Vowels occurring as part of grammatical endings.
5.) Words of fewer than three syllables.
6.) Vowels in hiatus, unless the hiatus was removed at an early date by a process such as metathesis (nuclĕus > nocciolo).
7.) Words in which a vowel was absorbed through palatalization, labialization, or similar assimilatory processes.
8.) Onomatopoeic words.
9.) Words whose cited etymologies show a high probability of morphological or analogical contamination.
10.) Vowels in verbal stems whose position relative to the primary accent changes within the verbal paradigm.
11.) Proper names.
12.) Demonstrably late borrowings from Latin.

(1) Meyer-Lübke often gave the reflexes of Latin forms in a number of Italian dialects. Since the results reported in the following

sections were drawn from entries for standard Italian, derived largely from the Tuscan dialect (but see footnote 3), no citation from the REW was used unless it contained an entry for "Italian" or "Tuscan".

(2) Words of non-Latin origin were excluded, since it is impossible to determine with any certainty exactly what form they took when adapted to Latin or early Italian. This is especially true of Arabic and Germanic words, and somewhat less so in the case of Greek, which is better documented but still retains areas of considerable uncertainty.

(3) Words formed by the addition of productive prefixes or suffixes, such as _dis_-, _ad_-, were not included, since in such forms the presence of the morpheme boundary generally alters the stress patterns. In the case of prefixes such as _ex_-, which became firmly affixed at an early date, such exclusion was unnecessary.

(4) Grammatical endings were not used to provide data on the evolution of unstressed vowels, since they were nearly always preserved, with a greater frequency than would be expected from the phonetic environments alone. This is true not only of final vowels and vowels of verbal endings, but also of the theme vowels of infinitives, which indicate the grammatical class to which the verb belongs. It has generally been claimed that the preservation of final vowels is the result of their morphological function; this matter will be returned to in Chapter Four.

(5) Since only the evolution of relatively complex stress patterns will provide useful data regarding atonic positional hierarchies, only words of three or more syllables were included. Contrary to the remarks of Meyer-Lübke cited above, there appeared to be no difference

in the evolution of pretonic and posttonic 'peripheral' vowels correlated with the number of syllables intervening between them and the main stressed syllable. By including only words of three or more syllables, a much greater number of individual cases of particular environments could be presented within the stated limitations.

(6) Vowels in hiatus generally do not behave like vowels in other positions, since hiatus combinations often become diphthongs or reduce in other ways.[6] As a consequence, an unstressed vowel in hiatus was not included as an example of an atonic vowel, although a word exhibiting a hiatus might be included if it contained other vowels in allowable positions.

(7) Vowels which were subsequently absorbed through palatalization, labialization, or similar processes were not regarded in the tabulation of unstressed vowels, since these vowels fell prey to other processes.[7] For example, in *facio* > *faccio* >[fáččo] the *i* would not be included as an example of an atonic vowel. In most cases, hiatus combinations were involved, so that this category may be considered as a special case of (6) above.

(8) Onomatopoeic words, including words denoting the sounds made by animals, were not considered. Sometimes such words undergo the normal phonetic modifications in a language, but it may be that their evolution is retarded, due to the special function carried out by their phonetic shape.[8]

(9) In certain cases, the etyma posited by the REW were too far from the end results to have suffered only the normal phonetic evolution. In some cases, the path of analogical or morphological contamination is obvious,[9] while in other cases no ready answer presents itself. All such words of doubtful etymology or containing obvious morpho-

logical contamination were eliminated outright, since they suffered intermediate changes which are not fully documented.

(10) Since the point of the statistical analysis was to study the evolution of atonic vowels in well-defined and consistent positions, it was not possible to include instances of vowels in verbal stems which alternate between stressed and unstressed position within the paradigm.[10] This often resulted in the exclusion of verbal forms except the so-called 'strong' infinitives of the second conjugation in which the stress falls on the stem rather than on the theme vowel of the infinitival ending. In other cases, however, available evidence indicated an early shift of stress away from the theme vowel, and such forms, if meeting the other requirements, were included in the calculations.

(11) Proper names were not considered in compiling the statistical data, for they too appear to form a special class with respect to phonological modification. Toponyms are frequently the result of derived or inflected forms, combined with cases of borrowing, substrata, superstrata, and dialect mixture.[11] While of great interest to historical dialectology, toponyms often present insoluable etymological problems. Names of individuals, perhaps in view of their clearly referential function, seem to enjoy a certain prominence, and their original pronunciation may conceivably be retained, at least for a while, conflicting with the course of an otherwise regular sound change. For these reasons, names were omitted altogether, rather than incur further indeterminacy. The number of such cases is small and offers no serious impairment of the overall results.

(12) The most difficult question encountered in any historical study is the separation of 'learned' from 'popular' forms. The

generally employed method is hopelessly circular, since learned forms are regarded as precisely those words which have not undergone the 'normal' evolution expected of words of the language in question. In the REW, Meyer-Lübke noted the evolutions which he regarded as *Buchworten*, and in the majority of cases, these are forms which have not undergone the 'typical' Italian evolutionary pattern. He noted, for example (1967: 14-5):

> Sono d'origine letteraria le voci colle seguenti formole intatte: ... l'*e* protonica; perchè dall'*ē* lat. si aspetta *i*. *Reprimire*, *repubblica*, *declinare*, *regalo* e simili sono d'origine letteraria, *midollo* < MEDULLA ecc. d'origine popolare.

Meyer-Lübke also brands as learned 'l'-*o*- di -*olo* -*ola*' in such forms as *cupola*, *discipolo*, etc. Grandgent (1927: 37) also lists as 'Latinisms' developments like *sebaceus* > *sebaceo*, *sēcare* > *secare*, *mĭcantem* > *micante*, etc. When considering such statements, it is tempting to regard the appraisals of learned versus popular status at face value, since much more consistent results may be obtained. However, the circularity inherent in such a procedure is unavoidable, and consequently, in the data reported below, no attention was given to Meyer-Lübke's classification. The only 'learned' forms which were rejected were those which may be attested, either through Meyer-Lübke's writings or elsewhere, as relatively recent borrowings into Italian of Latin terms, generally of a specialized nature. The result is that the true percentage of learned words in Italian probably falls between the figures cited by Meyer-Lübke, which are undoubtedly too high, and the figures reported below, in which no 'learned' words have been excluded in principle.

2.2.4. Preliminary results. By applying the sampling method described above, a corpus of 814 forms was arrived at. Since final vowels were not studied, in view of their potential function as morphological markers, and their almost universal retention in unmodified form, word-final vowels were not tabulated. Also, since conjugated verb forms were excluded from the discussion, the number of different positions which could be studied was further limited.[12] All together, sufficient data were collected for the following positions: initial pretonic, initial pre-pretonic, second pretonic, posttonic penult, and intertonic. While this list by no means exhausts the possibilities exhibited by Italian words, it provided a sufficient amount of variation to permit a more detailed study of positional hierarchies.

The preliminary results arrived at by tallying the vowel developments of the test words are displayed in Table 1:

	intertonic	posttonic penult	second pretonic	1st pre-pretonic	1st pretonic
# of examples	14	232	120	151	453
# retained	5	135	88	145	439
% retained	36	58	74	96	94
# modified	0	81	30	37	98
% retained unaltered	36	23	34	74	78

Table 1: Italian atonic vowels

There is no *a priori* test of statistical significance which may be applied to these results to determine whether or not any meaningful figures have been obtained, but some preliminary observations may be offered. In keeping with traditional accounts, initial syllables appear to be consistently 'stronger' in terms of resistance to syncopation or loss, than intertonic and posttonic penult syllables. In addition, the word-internal pretonic syllable appears to occupy a weak position comparable to that of the posttonic penult and the intertonic. The percentage of vowels retained unmodified is more significant than the percentage of vowels simply retained, since modification of atonic vowels is, like loss, another measure of diachronic weakness.

There seems to be no significant difference between the initial pretonic syllables and the initial pre-pretonic syllables, while the second pretonic is considerably weaker than the initial syllable, thus failing to confirm Meyer-Lübke's statements about these positions. Further discussion of these results must, however, be postponed until the following chapter, where the data are broken down into finer categories.

2.3 Hierarchies in Spanish

2.3.1. Introduction. The preceding section has sketched the structure of the diachronic phonological hierarchy which may be inferred from an examination of the developments occurring in early Italian. Based upon position within the word, atonic positions may be clearly ranked according to their intrinsic degree of phonological strength, measured by resistance to syncopation and modification. A strength hierarchy of this nature may be utilized to lay the groundwork for characterization of later sound changes affecting the Romance languages, and as such may represent a theoretical proposal with far-reaching consequences. Because of the importance to the incorporation of a rigidly formulated theory of phonological hierarchies into diachronic linguistics, further evidence must be adduced which points to the existence and viability of such hierarchical behavior. In the case of the Romance languages, the phonotactic heritage stems from Latin, and hence it is most natural to search for comparable configurations among the other Romance languages, in order to disqualify the null hypothesis, namely that the observed hierarchy in Italian is the result of mere coincidence.

The utilization of data from other languages can serve as a test of the validity of the results obtained in Italian, and may also function independently to provide additional information on these languages. In particular, one may hope to discover analogous, if not identical, hierarchical behavior in some of the other Romance languages, since several of the languages bear a marked resemblance to Italian in terms of phonological development, and any such discoveries will thereby strengthen the arguments used to document the hierarchy which has already been isolated. In the remainder of this chapter, two additional Romance languages are surveyed, with the goal of providing a more comprehensive view of phonological behavior among the western Romance languages, and in order to strengthen claims that values of diachronic strength be included in historical descriptions of early Romance, and perhaps in synchronic descriptions of at least some of the modern Romance languages. Insofar as the data converge in certain directions, the parallel evolution of the three languages may be traced, and the possibility of encouraging the search for mutually shared phonological characteristics may be viewed in a somewhat expanded perspective.

2.3.2. Spanish as a test language. The major Romance language bearing the closest superficial resemblance to Italian is Spanish, or more appropriately, early Castilian. Spanish, like Italian, exhibits phonotactic characteristics suggestive of hierarchical behavior, both with respect to word position, and with respect to the individual vowels; several quotations attesting to this fact were cited in Chapter One. Among other investigators, Lapesa (1968: 61) has characterized the relative position of Spanish within the Romance family as follows:

> Dentro de la Romania occidental, unas lenguas se muestran más revolucionarias y otras más conservadoras. El francés ha llevado hasta el último extremo las tendencias generales. No se ha contentado con suprimir la acentuación esdrújula, sino que, debilitando toda vocal posterior al acento, ha generalizado el ritmo agudo ... En cambio, el español es más lento en su evolución. Domina en él el acento llano o trocaico, intermedio entre los abundantes proparoxítonos del Oriente y el ritmo oxítono del francés; incluso conserva la vocal postónica con relativa frecuencia.

The modification and syncope of unstressed vowels in Spanish was largely confined to the earlier stages of the language, representing the gradual emergence of a well-defined vernacular from the spoken Latin of the Iberian Peninsula. In general, word-internal vowels fared rather poorly in early Spanish, tending to drastically diminish the number of proparoxytones found in the language. Lapesa (1968: 61) has noted, to this effect:

> En los romances occidentales el ritmo del lenguaje tiende a concentrar la fuerza expiratoria en la vocal acentuada, detrás de la cual no suelen tolerar más de una sílaba. En consecuencia, ha desaparecido o se ha reducido mucho la acentuación dactílica. En cambio, los romances orientales conservan gran número de esdrújulas.

Spanish appears to be a promising candidate for an analysis of the sort carried out for Italian, since the language has consistently exhibited a differential treatment of stressed and unstressed vowels. In addition, Spanish shares with Italian the advantage of not having strayed too far from Latin in its phonotactic evolution, an advantage not enjoyed by French. Moreover, Spanish is well-documented in the early stages, a critical requirement when attempting to deal with posited etymological developments on a large scale, and the patterns of evolution have been fairly well established. By comparing the early Spanish forms with their respective etyma in Latin, it is possible in most cases to trace the route of evolution, with the result that tabulations may be attempted which will not seriously suffer in accuracy or completeness.

Focusing now on the specific vocalic evolutions of Spanish, one may reconsider the remarks of Menéndez Pidal (1966: 67), summing up the history of the Spanish atonic vowels:

> La vocal a es tan resistente que, aun inacentuada, se conserva en todas las partes de la palabra en que se

> halla. La suerte de las otras vocales átonas está determinada por la resultante de dos condiciones: primera, su colocación respecto del acento; segunda, su colocación en el comienzo, medio, o fin de la palabra. La posición inicial es la más firme, la que da más resistencia a las vocales, la que más asemeja a la acentuada; sigue luego la final; la vocal menos resistente es la medial, que se pierde frecuentemente, lo cual se explica bien por su cualidad de relajada ...

Turning his attention to more specific cases, Menéndez Pidal notes (p. 75) that 'la postónica interna desaparece en general, debido a ser vocal relajada'. This however, is qualified (p. 77) by the addition that 'la *A*, que se perdía en latín vulgar, ... dejó de perderse en romance'. Additional information is added (pp. 77-8):

> Se conserva la *I* postónica en romance cuando se pierde la consonante oclusiva sonora ... Fuera de los dos casos anteriores, las otras excepciones se dan (aparte las voces cultas) en voces semicultas.

Speaking of word-internal pretonic vowels, Menéndez Pidal adds the following remark: 'La vocal *A* se conserva siempre ... las otras vocales desaparecen por efecto de su carácter relajado. Ya en latín vulgar se perdía la protónica después de *r*'.

The above remarks give an indication of the extent to which the phonotactic evolution of the Spanish atonic vowels paralleled that of unstressed vowels in Italian, for many of Menéndez Pidal's remarks quite accurately pinpoint the results reported previously for

Italian. This degree of correspondence between Spanish and Italian, added to the methodological advantages signalled above, facilitates a more thorough analysis of Spanish. The groundwork is laid for a comprehensive statistical survey, designed to put to empirical test the anecdotal remarks found in historical grammars of the Spanish language.

2.3.3. Selection of the corpus. To ensure maximum standardization of results, recourse was again made to Meyer-Lübke's *Romanisches etymologisches Wörterbuch* to obtain a sample of Spanish evolutionary developments which could form the basis for a statistical analysis. The class of forms to be categorically excluded from the Italian data is also pertinent to the study of Spanish, and consequently the same eliminations were made from the Spanish data. This is especially necessary when considering words borrowed from Arabic,[13] of which Spanish contains a great number, for these words, while eventually attaining a configuration indistinguishable from that exhibited by words of Latin origin, underwent a series of complex and often untraced phonetic modifications before being adopted into Spanish. A good survey of the scope of such phonetic mutations is found, for example, in Entwistle (1962: 126-34) and Lapesa (1968: 95-110),[14] where the unfeasibility of including such forms in the following analysis is vividly demonstrated. Greek words fared much better in Spanish, since far fewer modifications had to be effected to regularize them,[15] but in the interest of accuracy, these words were also eliminated from consideration. In the case of Spanish, more verbal infinitives were eliminated, since Spanish merged the Latin second and third conjugations, destroying the independent status of the 'strong' verbs still found in Italian.

When dealing with Spanish, Meyer-Lübke's REW becomes an even less ideal research tool than for Italian, which was one of Meyer-Lübke's primary areas of competence. The volume contains a number of errors with respect to the etymological sources of modern Spanish. In those cases where an error was suspected, the form in question was compared with the results to be found in other works of Spanish historical grammar, such as Entwistle (1962), Menéndez Pidal (1966), Lapesa (1968), etc. The corrected etyma were used in the tabulation of the data. Although all the entries were scrutinized, the total number of apparent discrepancies was relatively small, and consequently the overall accuracy of the results has probably not been significantly altered by these manipulations. In a handful of cases where the available resources were insufficient to resolve a problem of etymology, the form in question was bypassed in favor of a more straightforward development.

Once the categories to be excluded had been established, the same random sampling method utilized to gather data on Italian was employed; namely, the selection of the first acceptable word on each page of the REW. This sampling procedure yielded a corpus of 814 words, which was subjected to further analysis.

2.3.4. Preliminary results. As in the case of Italian, the only atonic environments studied were intertonic, posttonic penult, second syllable pretonic, initial pre-pretonic, and initial syllable pretonic. Final vowels were not considered, since their role as morphological markers may have prevented their loss or effacement in Spanish (cf. Chapter Four). The uncorrected data for the five atonic positions are given in Table 2:

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	12	205	155	132	491
# retained	2	78	108	126	486
% retained	17	38	70	95	99
# modified	0	4	10	10	56
% retained unmodified	17	36	63	88	88

Table 2: Spanish atonic vowels

In this table, the atonic positions of Spanish may be clearly ranked along a hierarchy of diachronic strength, based both on overall rate of retention and on rate of modification; from weakest to strongest: intertonic, posttonic penult, second syllable pretonic, initial pre-pretonic, initial pretonic. Furthermore, the two initial positions are of nearly equal diachronic strength. Both the posttonic penult and intertonic syllables demonstrate a much greater weakness with respect to resistance to loss or modification, while the second syllable pretonic (i.e. word-internal pretonic) vowels occupy a position nearly halfway between the posttonic penult and the intertonic on the one hand, and the initial atonic syllables on the other. Taken as a preliminary indication, therefore, the results reported in Table 2 strongly suggest an analogous hierarchical behavior pattern for the Spanish atonic vowels, a pattern which, however, must be further refined before any conclusions may be drawn.

2.4 Hierarchies in Portuguese

2.4.1. Introduction. In order to lend additional substance to the argumentation presented in the preceding sections, data from one additional Romance language will be presented for discussion and analysis. By comparing the data from the three languages, a more general formulation regarding the role of phonological hierarchies in diachronic developments may be arrived at, and more substantiated statements may be offered regarding the incorporation of such concepts into the theory of historical linguistics. The choice of an additional language is not an easy one, for all the remaining Romance languages present methodological obstacles. The various non-Tuscan Italian dialects, while providing many useful observations, are insufficiently documented and exhibit a great deal of intermixture which would render untenable any investigation trying to separate them from data concerning the Tuscan dialect. Rumanian is also unfeasible for consideration, for several reasons. In addition to the almost nonexistent documentation for earlier stages of the language, Rumanian has been strongly influenced by the neighboring Slavic languages, particularly Old Bulgarian, with the result that it is impossible to consider diachronic developments in Rumanian exclusively within the context of the Romance languages.[16] French, on the other hand, eroded atonic vowels at a very early stage, and presents such a complex and intermixed set of developments as to render any accurate etymological tracing nearly impossible. Rheto-Romance shares with Rumanian a nearly complete lack of documentation, as well as a great deal of influence by neighboring languages. This process of elimination therefore leaves for further consideration only Portuguese and Catalan, Romance languages closely related to Spanish, but which also enjoy a well-documented linguistic history of their own. Due to the methodological difficulties associated with establishing a large corpus of Catalan data, described in Chapter Four, Portuguese was chosen as the third language to be surveyed in this study, subject to the limitations discussed below.

2.4.2. The choice of Portuguese. Portuguese derives from the same Ibero-Romance proto language as the Spanish dialects, but from the earliest times, Portuguese has exhibited developments which justify its classification as a separate Romance language. The primary reason which has been ascribed to this differentiation, aside from geographical isolation, is the relative scarcity of Germanic influence in Portugal. Thus Williams (1962: 11-2) states:

> Probably the most important cause of differentiation [of the Romance languages] was the intensified stress accent, superimposed, as it were, upon the Vulgar Latin of Italy, Gaul, and the Iberian peninsula in varying degrees by the invading Germanic races ... Additional Germanic invasions ... brought about further intensification of the stress accent, and with the rise of the Romance languages, syncope of the vowel of the posttonic penult and the intertonic syllable became a general phenomenon no longer limited to the special positions in which it occurred in Vulgar Latin. But the additional Germanic invasions did not reach the territory where Portuguese was to develop. Aside from Visigoths and Suevi, no Germanic tribes ever settled in this territory, and Visigoths and Suevi left but slight traces of their stay. The

> linguistic result was that there was less stress accent than in other Romance territory, and accordingly, less syncope ... The separate Romance which developed in the south among the Mozarabs was entirely free of Germanic influence: hence the especial fondness of the people of the south even today for proparoxytones. Thus while certain characteristics of Old Portuguese, such as the fall of intervocalic *l* and *n*, arose in the north, the resistance to syncope, a far more distinctive characteristic, was stronger in the south.

Entwistle (1962: 278) remarks that 'Roman Lusitania extended so far into Spain as to include Ávila. This dialect was eminently conservative ... proparoxytones appear to have been unusually tolerated'. Thus, perhaps as a result of decreased Germanic influence and also of political independence from Spain, Portuguese developed into a unique language, which in some ways resisted certain sound changes affecting Spanish, and in other ways underwent changes to a more complete extent than Spanish.

As noted above, Portuguese frequently tolerated atonic vowels in positions where the vowels were lost in the other western Romance languages. This is particularly true with respect to the posttonic penult. Williams (1962: 52-3) has characterized the conditions under which the posttonic penult was lost:

> If the posttonic penult was *e* or *i* (Cl. L. *ĕ* or *ĭ*), preceded by *l*, *m*, *n*, or *r*, or preceded by *c* and followed by *t*, it fell in the late Vulgar Latin or early Portuguese period ... this change took place before the time of the fall of inter-

> vocalic *l* and *n*, but after the time of the voicing of intervocalic [k] and *t* ... if the *e* was preceded by *m* but followed by a short *n*, it did not fall ... the nasalization of the penult by the adjacent nasal consonants may have increased its resistance to syncope. All posttonic penults which did not fall in Vulgar Latin and in which the [above] conditions ... did not obtain, remained in Portuguese.

Essentially the same conditions are offered to account for the behavior of the intertonic syllable (Williams 1962: 55-7):

> If the intertonic vowel was *e* (Cl. *ē*, *ĕ* or *ĭ*), or *i* (Cl. L. *ī*) preceded by *l*, *m*, or *r* or preceded by *c* and followed by *t*, it fell in the late Vulgar Latin or early Portuguese period ... with few exceptions this change took place before the time of the voicing of intervocalic [k] and *t* ... in some words syncope of the intertonic vowel was avoided because of the unprounceable combination that would have resulted from it ... if intertonic *e* was preceded by *m* but followed by a short *n*, it did not fall ... if intertonic *e* was preceded by *n*, it did not fall as the posttonic penult did ... this seems to indicate either that syncope of the intertonic took place later than syncope of the posttonic penult or that intervocalic *n* fell earlier before the intertonic than before the posttonic penult ... all intertonic vowels which did not fall in Vulgar Latin and in which the conditions [above] did not obtain, remained in Portuguese.

Williams' observations, representing one of the most comprehensive treatments of the fate of Portuguese atonic vowels,[17] propose a rigid categorization of environments characterizing the loss or retention of atonic vowels in Portuguese. The present study sought to refine these observations by offering a statistical analysis of the evolution of the Portuguese atonic vowels, which could then be compared with the data representing Italian and Spanish.

2.4.3. Selecting the corpus. As when dealing with Spanish and Italian, use was made, for considerations of consistency and faute de mieux, of Meyer-Lübke's REW to obtain the basic data. To a much greater extent than was the case when dealing with Spanish and Italian, the REW presents obstacles to the study of Portuguese, which must be discussed before an examination of the results may be undertaken.

The same categories of forms which were eliminated in principle from the Spanish and Italian data were also eliminated from the data of Portuguese, for the reasons given in the preceding sections. In addition, Portuguese presents special problems which required the elimination of various other categories.

The most obvious, and also most tenacious problem concerns the loss of intervocalic l and n, a process occurring in the earliest stages of the language. Both l and n were lost somewhere around the beginning of the tenth century,[18] leaving, in the former case, two oral vowels in hiatus, and in the latter case, a nasalized vowel in hiatus with a following oral (but progressively nasalized) vowel. Since the date of these processes nearly coincides with the date of syncopation of the posttonic penult and intertonic syllables in late Latin or early Portuguese, serious problems of relative chronology arise when attempting to attribute a form either to the Vulgar Latin epoch or strictly to the early Portuguese era.[19] In general, if the Portuguese reflex of a Latin form shows evidence of a creation of a hiatus or of a hiatus reduction (e.g. *nebŭla* > *névoa*; *popŭlus* > *póvoo* > *povo*), one may safely attribute the form in question to the early Portuguese period. However, in forms giving evidence of syncope (e.g. **caracŭlum* > *caralho*), one runs the risk of total circularity by ascribing them to the Latin period, since one is then defining the period by means of the definition itself. In a few cases, such as words listed in the *Appendix Probi* or developments listed in reference works such as Grandgent (1934), Kent (1945) or Palmer (1954), evidence exists that these words had undergone syncope in the Vulgar Latin period, but in most other cases such assurance is impossible. For reasons of methodological soundness, it seems preferable to view the situation in terms of two *conflicting* processes, yielding mixed results, rather than as two *successive* processes.[20] Consequently, no attempt was made, when collecting the data, to differentiate between words of supposedly Vulgar Latin provenance, and words undergoing modification in later stages of Portuguese. The end result of this methodological assumption is a much higher apparent rate of syncope in certain atonic environments than is probably to be accurately ascribed to old Portuguese itself; however, since the topic of interest is the overall evolution of Portuguese, these figures at least provide a complete picture of the diachronic strength of atonic positions over an extended time period.

Another serious obstacle concerns the presence of nasalized vowels in Portuguese. The exact date of vowel nasalization in

Portuguese is impossible to determine, but it is certain that the process was initiated prior to the loss of intervocalic n. As in French, Portuguese nasal vowels represent a separate subclass, and never undergo syncopation.[21] This is especially true in cases where the nasalization is probably of very early origin, but the point of disappearance of the following consonant remains an unanswered question.[22] Prior to the date of the loss of the nasal consonant, considerations of phonotactic compatability, to be discussed in the following chapter, precluded loss of the vowel preceding the nasal; once the consonant was effectively lost, however, leaving behind only a nasal vowel, this vowel has consistently resisted syncopation. For this reason, all environments potentially leading to nasalized vowels were eliminated from consideration, since no useful results could be obtained through their inclusion.[23]

Another issue serving to complicate the process of selection of a corpus concerns the raising of unstressed vowels. In providing figures for Spanish and Italian, raising of unstressed vowels was taken to be one measure of the phonological weakness of a particular position, and also of individual vowels. In most dialects of Portuguese, however, all unstressed vowels were eventually raised in speech, to a greater or lesser extent depending upon position and also upon the dialect; such raising is not always represented orthographically. Early Portuguese had no graphy with which to represent a raised variant of a, and consequently one cannot determine the date at which the general raising of atonic a to [ɐ] took place. Some investigators have speculated that this change dates back to the earliest stages of the language, while others insist that it was only later that atonic a was raised to its present centralized position.[24]

In the case of unstressed e and o, matters proceed somewhat more smoothly. In the majority of modern Portuguese dialects, atonic o is raised to [u] in most environments, and in certain derivational paradigms atonic [ɔ] may be raised to [o].[25] Atonic e, initially raised to [i], has now become [ə] in most of Portugal, the Cape Verde Islands, and the Azores, but remains as [i] in most areas of Brazil, although in Brazil the overall rate of raising is substantially less than in Continental Portuguese. In certain derivation paradigms, atonic [ɛ] also becomes raised to [e]. The raising process which accounts for the raised variants of e and o in the modern dialects may be traced with a fair degree of certainty to the sixteenth century,[26] and hence is of no direct relevance here. On the other hand, since modern Portuguese exhibits raised variants of atonic vowels in a number of positions, together with various exceptions and a high degree of inter-dialectal variability, the task of sorting out those vowels which became modified during the earliest periods of the language becomes somewhat more formidable. The problem, however is not as unresolvable as it seems on first inspection, for, except in the case of the still untraced evolution of atonic a, atonic vowels which were raised in the early stages of Portuguese were reflected orthographically. This change, while recorded in numerous forms, was comparatively less common than in Italian, and apparently even less common than in Spanish. The raising process occurring around the sixteenth century has, in the overwhelming majority of cases, left no orthographic traces of its existence in the language, except in isolated cases of Portuguese words' being borrowed into other languages.[27] In consequence, a reasonable etymological accuracy may be achieved by considering the spelling of the words in question.

Portuguese also underwent a number of isolated but frequently quite regular changes which must be taken into consideration when tabulating the data on the evolution of atonic vowels. Most common are cases of the vocalization of a consonant, which generally created a diphthong, which was then reduced to a single vowel of timbre different from the original. The process of vocalization of syllable-final l, begun in Latin, has continued to the present day in many dialects of Portuguese, especially in Brazil, but it is generally not orthographically represented after the earliest stages of the language.[28] In general, any cases apparently involving vocalization or metathesis resulting in a change of vowel timbre were discarded from the data, so that the tabulated results reflect only the evolution of atonic vowels uninhibited by additional conflicting changes.

2.4.4. Preliminary results. Once the list of classes to be eliminated from the data had been established, the random sampling procedure employed to gather data for the preceding sections was again utilized to obtain a sample of Portuguese forms. The only environments available for consideration were the posttonic penult, intertonic, internal pretonic, and initial pretonic and pre-pretonic syllables. The uncorrected results of the tabulations are given in Table 3. In this table, the appearances of hierarchical behavior of atonic positions are seen, along the same scale elicited for Spanish and Italian. This comes as no surprise, especially considering the high degree of similarity between Portuguese and Spanish. In fact, it may be argued that, in view of the large influence which Spanish has exerted on Portuguese at various points in the past, the data reported in Table 3 are merely a reflection of the events occurring simultaneously in Spanish. Such an allegation can of course not be entirely dismissed, but in collecting the examples representing Portuguese, every effort was made to weed out those forms which, either through explicit citations or through highly unusual phonetic development, appear to have been borrowed through Spanish. The redeeming virtue of the Portuguese data is the scope of the survey, taking into account a large segment of the words derived from Latin, a scope hopefully sufficiently wide as to eliminate gross inadequacies caused by the effects of borrowing.

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	16	163	125	131	545
# retained	5	48	100	125	538
% retained	30	29	80	95	99
# modified	0	3	10	10	48
% retained unmodified	30	28	72	88	90

Table 3: Portuguese atonic vowels

2.5 Summary

The historical behavior characterizing the evolution of Portuguese appears to be consistent with the data representing the corresponding time periods in Spanish and Italian, which therefore further supports the validity of the posited hierarchies within the overall diachronic perspective of the western Romance languages. Portuguese, like the other two languages surveyed, may be described in terms of a metatheoretical statement, based on the facts of diachronic hierarchies. Such hierarchical indices, further bolstered by parallel developments in Spanish and Italian, provide an additional dimension to the synchronic description of Portuguese, and help lay the supporting foundations for a more inclusive theory of phonological hierarchies, applicable to a wider range of languages, and potentially add a new element to the search for links between synchronic and diachronic descriptions. It seems that the similarity between the Portuguese data and the Spanish data further supports the proposal of diachronic hierarchical processes in both languages. Further discussion of these results must await the inclusion of additional phonotactic factors.

Notes to Chapter Two

1 This operating principle has been named the 'uniformitarian principle' by Labov (1971: 422-3). The matter is briefly returned to in Chapter Six.

2 When the same results are arrived at by the apparently principled interaction of two or more diverse processes, the interaction is often termed a 'rule conspiracy'. See Chin Wu Kim (1970), Kisseberth (1970), and the literature which has arisen from the latter's work. For a study on the fortuitous interaction of divergent processes, see Malkiel (1963-4). The possibility of multiple causation as a methodological desideratum is noted by Malkiel (1968: 27).

3 On the other hand, dialect mixture was extensive during this time period. This fact has frequently been used to discard as 'non-Tuscan' any form not undergoing the hypothetical 'regular' Italian developments (cf. Parodi 1907), and has led to circular results. In this study, no attempt was made to discard forms on the basis of dialect, except where no reflex in Tuscan could be discovered. The investigation was directed toward the loss and modification of atonic vowels, a process common to all the Italian dialects. Indeed, loss of posttonic penult and intertonic vowels appears to have been significantly higher in Sicilian and the southern Italian dialects. Thus, failure to make provision for dialect mixture may have changed the absolute figures to be reported below, but probably did not significantly alter the relative proportions. Moreover, comparison with the data of

Spanish and Portuguese, where the problem of dialect mixture is not nearly so severe, serves to verify the feasibility of utilizing the Italian data.

4 Cf. Grandgent (1927).

5 The use of an etymological dictionary of Italian was deemed unsatisfactory for three major reasons. First, since the starting point would be Italian rather than Latin, it would be necessary to sort through a large number of derivative forms, foreign borrowings, compound words, etc., which would increase the amount of time required for the investigation without appreciably improving the results. Second, since only the posited derivation from Latin to Italian would be given, it would be impossible to make an instant comparison with the reflexes among the remaining Romance languages of a given Latin form; thus it would be harder to double check the accuracy of the proposed etyma. Finally, use of a Italian dictionary would eliminate the possibility of using the same source of data for all three languages, thus severely impairing the standardization of data. The only other available Romance etymological dictionary was that of Diez, which is smaller and less complete than the REW, and was therefore felt to be inferior as a research tool. For the present study, the fourth edition of the REW, of 1968, was utilized. This book, in addition to numerous indices and introductory sections, contains 9,721 etymological entries spread over 814 pages.

6 Cf. Mendeloff (1969: 4, 11). In no case was a vowel in hiatus lost, although in a few cases two similar or identical vowels

might coalesce into a single vowel. In other cases, depending upon the stress configurations, one of the (non-low) vowels was raised to i or u, and then changed to the corresponding glide [j] and [w], respectively. This happened in all atonic positions, with no apparent connection with the hierarchical behavior of atonic positions.

7 Cf. Mendeloff (1969: 11). In all such cases examined for the Italian data, absorbtion of the vowel appeared to be a purely phonetic process of assimilation, in no way connected with accentuation, and hence not connected with the problem of hierarchical structure. As in the preceding case, these instances were comparatively rare.

8 For the special treatment of onomatopoeic words, see, for example, Sá Nogueira (1936), Malkiel (1963-4), Wescott (1971), and Morin (1972).

9 For example, the paradigm of the verb fare, whose forms alternate with those of the proto-verb facere. Thus, in the present indicative, fare is conjugated as: faccio (old fo), fai, fa, facciamo, fate, and fanno. Some variant of the stem fac- appears in all the other conjugations except the future and conditional which, formed from the infinitive, exhibit the stem far-. The imperative forms of fare are fa', faccia, facciamo, fate, and facciano. Other common examples of morphological mixing include the third conjugation verbs formed with the inceptive infix -isc- which appears in certain forms of the present indicative and subjunctive; for example, the present indicative of capire: capisco, capisci, capisce,

capiamo, *capite*, *capiscono*.

10 Cf. the methodology of Clark (1905: 66), when faced with a similar set of data involving Italian verbs.

11 Cf., for example, Elcock (1960: 221).

12 Since the greatest diversity of accentual patterns, in Italian, Spanish, and Portuguese, is found among the verbal paradigms.

13 Patterson (1973) reports on a statistical study of the genealogical characteristics of the Spanish lexicon. Of the 5,000 most common words, representing 95% of a typical Spanish text, 23.50% are inherited directly from Latin, 35.24% are created forms, and 41.26% are borrowed from other languages, including Classical Latin. These relative proportions change significantly when considered in terms of estimated text frequency: 81.3% inherited directly from Vulgar Latin, 8.07% created forms, and 10.62% foreign borrowings. As based on text frequency, the relative proportions of borrowed forms are as follows: Classical Latin: 84.66%, other Romance languages: 9.06%, Greek: 3.27%, Arabic: 2.33%, other languages: 0.68%. These figures demonstrate the feasibility of utilizing only words inherited directly from Vulgar Latin as the basis for a representative characterization of the Spanish language, since such words comprise more than 80% of the effective vocabulary.

14 Other examples of the development of Arabic words may be found in Elcock (1960: 272-96), and Giese (1931, 1964). Politzer (1954) offers some additional phonetic possibilities concerning develop-

ments in Romance with possible parallels among Arabic borrowings.

15 See, for example, Lapesa (1968: 44-7), Grandgent (1934: 64-6), Meyer-Lübke (1890a:35), Seelmann (1885: 42-9), Entwistle (1962: 43-5), and Elcock (1960: 196-203) for data concerning the incorporation of Greek words into the phonetic pattern of Latin and the early stages of the various Romance languages.

16 For an idea of the scope and nature of the Slavic influence on Rumanian, see Petrovici (1957) and Hadlich (1965).

17 For other reasonably comprehensive treatments of Portuguese vocalic evolution, of which Williams' work represents a survey and summary, see Cornu (1888), Leite de Vasconcellos (1901), Huber (1933), Nunes (1945), Moffatt (1948), and Silveiro Bueno (1958).

18 For data concerning the loss of intervocalic l and n, in Portuguese, the most thorough treatment is offered by Sletsjøe (1959). Additional information may be found in Entwistle (1962: 288-9), Williams (1962) and most general manuals of Romance philology.

19 For some further elaboration of these problems of relative chronology, see Louro (1952) and Otero (1971: 58-9).

20 The problem of evaluating the results of conflicting or competing sound changes is a significant one, and has recently been discussed at length by Wang (1968), Chen and Hsieh (1971) and Chen (1972).

21 Cf. Lausberg (1956: 96-7).

22 In most dialects of modern Portuguese, a word-internal nasal vowel

followed by an obstruent generally prenasalizes the following consonant, to produce a fleeting transition sound homorganic with the following consonant. It appears, however, that the actual consonant originally giving the source of vowel nasalization eventually disappeared in the earlier stages of the language.

23 For further information on the formation of the Portuguese nasal vowels, and of nasalized vowel systems in general, see Nobiling (1903), J. Bourciez (1949), Rochet (1970, MS), Lightner (1970), Saciuk (1970), Foley (1970, MSb) and Schourup (1973).

24 See, for example, Vasconcellos Abreu (1887), d'Azevedo (1900), Gonçalves Vianna (1906), Rohner (1948), Herculano de Carvalho (1962), Williams (1962: 40) and Moura Santos (1964).

25 Cf., for example, Jucá (1950) and Earl Thomas (1969: 347).

26 The most complete survey of the raising process is provided by Naro (1971b). In addition, see Herculano de Carvalho (1962), Moura Santos (1964), Prado Coelho (1946), d'Azevedo (1900), and Révah (1958, 1959).

27 Some examples are discussed in Naro (1971b) and in Coates and de Silva (1960).

28 Mattoso Câmara (1957), in reviewing phonetically-based spelling errors of Brazilian school children has signalled several instances where syllable-final l (phonetically [w] in Rio de Janeiro, where his observations were carried out), has been spelled as though it were /w/, and vice versa.

CHAPTER THREE
ADDITIONAL PHONOLOGICAL FACTORS

3.1 Introduction

A hierarchy of diachronic phonological strength reflects the intrinsic characteristics of phonological elements across time. The values of strength represent the behavioral patterns characterizing each individual element as part of a total phonological system, which is in turn part of the sociolinguistic matrix in which the language is embedded. Phonological elements do not operate in a vacuum, and hence cannot be studied in isolation, free from considerations involving the totality of the linguistic system of which they form a part. An enumeration of all the factors which may have influenced a particular phonological development is virtually endless, and each specific investigation must select for special emphasis only those areas which appear to have exerted the greatest influence.

One area which can and must be explored in connection with the hierarchy posited in the preceding chapter is the relationship between the vowels in question and the surrounding consonants. Phonotactic congruity plays an important and independent role in phonological change, and the action of phonotactic factors must be clearly separated out of the data before the action of diachronic strength hierarchies can be observed. The remainder of this chapter contains an attempt at separating indications of phonological strength from the diverting forces of phonotactic structure. In addition, the hierarchical behavior of the individual vowels is studied, and some observations are offered concerning the possible physical basis for phonological hierarchies.

3.2 Consonant cluster compatability

The figures shown in Tables 1-3 (pp. 60-78) only represent a gross approximation to the phonological development of unstressed vowels among the three languages being studied, showing the overall rate of loss and retention in the various positions isolated for study. These figures, however, do not present a complete picture of the hierarchical arrangement of environments, for the data in these tables are independent of the syllabic structure of the three languages. The ultimate result of a process of phonetic weakening is the disappearance of the segment in question. In the case of the weakening of unstressed vowels, loss of the vowel juxtaposes two or more consonants which have previously been kept apart, or places consonants or groups of consonants in new positions with respect to the entire word. No known language permits all sequences of consonants in all positions, and in particular the distribution of consonant groups in Latin and the various Romance languages is very severely constrained. In view of these limitations, the syllabic structure of Latin and the Romance languages must be taken into consideration when evaluating the results of the statistical analysis of vowel weakening, so that spurious correlations do not result from failure to distinguish between inherent positional strength and the phonotactic resistance of a particular sequence of vowels and consonants.

Modern structural linguistics has made significant advances in the direction of characterizing the exact nature of consonant sequences in natural languages. The key notion in this regard is phonological compatability of clusters and potential clusters; i.e., the degree to which the distribution of consonant groups follows the basic structural laws of the language in question. Anderson (1965: 75) offers the following definition:[1]

> Intervocalic consonant clusters are considered structurally compatible to the phonological system if they are 'dissolvable'. They are dissolvable if they are composed of an initial sequence cc-, a final sequence -cc, or if the second member occurs in word initial position and the first member occurs in word final position. Word final position means before a pause or phrase final, i.e. something which can occur in absolute final position. On this basis the final consonants of prepositions are excluded.

From this definition, structural compatibility is a function of the juxtaposition of consonant sequences in the chain of speech. A logical consequence is that, for any given language, the set of all possible consonant sequences may be divided into four categories: occurring clusters which are dissolvable; non-occurring potential clusters which are dissolvable; occurring clusters which are non-dissolvable; and non-occurring potential clusters which are non-dissolvable. Anderson and other investigators who have dealt with the problem have claimed that during a process of syncopation, the first environments in which syncope will occur are those which will produce occurrent dissolvable clusters, followed by those which will produce hitherto non-occurrent but dissolvable clusters, followed by those which will produce occurrent non-dissolvable clusters, and only then followed by environments which would result in a previously non-existant non-dissolvable cluster. If the structural characterization of consonant clusters given above is correct, it follows that the implicational statement regarding the formation of new clusters through syncopation should also be correct. While Anderson's remarks deal only with cases of intervocalic consonant clusters, the same structural formulae may be applied to cases which would yield word-initial or word-final consonant clusters.

It was not the intent of the present study to test the structural hypotheses regarding the formation of consonant clusters, and indeed, in its strong form, giving an implicational statement for the formation of new clusters, it is probably impossible to verify the hypothesis for the early stages of the three languages under consideration. Nevertheless, since the goal of the statistical analysis was to isolate the action of a hierarchy of positional strength, the notion of intrinsic hierarchization must be separated from that of phonotactic compatibility of individual clusters. In order, therefore, to ensure that the results are not skewed by the introduction of factors of structural compatibility, only those vocalic environments which, in the event of loss of the vowel, would have yielded a compatible cluster along the grounds sketched above can be considered. This requires an ennumeration of the consonant cluster patterns of Vulgar Latin and those of the Romance languages under consideration.

As listed by Anderson (1965: 76-7) and Tai Whan Kim (1965: 56-7), Latin exhibited the following initial and final consonants and clusters, where the groups in parentheses cannot occur phrase-finally:

INITIAL					
p	sp	st	sk	pl	pr
b	spl	stl	skl	kl	kr
f	spr	str	skr	bl	br
v				gl	gr
t				fl	fr
d					dr
s					tr
k					
g	m				
l	n				
r	y				

FINAL		
t	(mp)	st
d	(lp)	(lk)
s	(rp)	ps
k	mps	ks
l	rps	ms
r	nks	ns
m	lks	

3.3 The developments in Italian

3.3.1. Compatible consonant clusters. Italian, while generally allowing only the consonants n, l, and r in word-final position, exhibits the following initial clusters, where clusters in parenthesis cannot occur phrase-initially:[2]

sp	spl	spr	pl	pr
st		str	(tl)	tr
sk	skl	skr	kl	kr
sb	sbl	sbr	bl	br
sd		sdr		dr
sf	sfl	sfr	fl	fr
sv			vl	(vr)
sg	sgl	sgr	gl	gr

sm
sn
sñ
sl
sr
sǧ

While virtually having eliminated final consonant clusters, Italian has greatly extended the range of possibilities for word-initial clusters, with the result that, from the point of view of structural compatibility, the phonotactic possibilities of Italian are not radically different from those of Latin. Anderson (1965: 83) posited, on the basis of the structural distribution of Latin consonant clusters, 'maximum potential holes' for the clusters *sb*, *sf*, *sg*, *Gd*, *Gv*, and *lr*. Italian, in turn, developed the initial clusters *sb*, *sf*, *sg*, and the medial cluster *lr*. The clusters *Gd* and *Gv*, with *G* representing the archiphoneme of /k/ and /g/, are no longer structurally compatible, since /G/ does not occur in final position. Most of the Italian clusters beginning in *s* which are not direct reflexes of Latin clusters, are the result of the prefixing of the morpheme *ex-* to verbal stems, with the initial *e* being lost at a very early date.[3] The clusters *sǧ* (*sgelare*), *sñ* (*sgnaulio*) and *sr* (*sradicare*) are later creations, formed by prefixing *s-* to an already existent form, following a pattern carried down from early stages of the language.

By intersecting, therefore, the posited consonant clusters for early Italian with those hypothesized for Vulgar Latin, only a handful of clusters remains which may not be fitted into both phonological systems; namely: *ps*, *ks*, *ms*, *mps*, *nks*, *lks*, and *rks*. The cluster *tl* appears to have been converted to *cl* before the transition to Italian, and it is doubtful whether such final clusters as -*mps*, -*rps*, -*lps*, etc. were pronounced as such during the period in question. It is therefore possible to arrive at a structural characterization of consonant clusters valid both for Vulgar Latin and for early Italian, which may then be applied to the corpus of data. It is impossible to verify the order in which new consonant clusters were formed. However, in view of the above remarks, all those environments that would have yielded a non-dissolvable cluster may be weeded out of the data, and only those environments which would have produced a structurally compatible cluster, whether or not occurring in Vulgar Latin, may be retained for study. In this way, another variable will be removed, and the role of positional hierarchization may be seen in a more unobstructed fashion.

3.3.2. *Behavior of atonic positions*. Considering, therefore, only vowels in 'permissable environments', i.e. environments in which loss would yield a compatible cluster, the results given in Table 4 emerge from the data. A comparison of Table 1 and Table 4 reveals that almost no vowels were lost in cases where a non-dissolvable cluster would have been produced, thus strongly supporting the structural characterization and classification of consonant clusters which has been utilized. The hierarchical behavior of atonic positions emerges more clearly after the non-compatible environments have been removed; the intertonic and posttonic penult syllables seem to be the weakest, followed closely by the second syllable pretonic, with the initial syllables being considerably stronger, perhaps with a slight advantage being afforded to the initial pre-pretonic.

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	11	147	67	29	65
# retained	2	56	33	23	51
% retained	18	31	49	80	78
# modified	0	24	11	3	8
% retained unmodified	18	21	33	69	66

Table 4: Italian atonic vowels; permissable positions

Another interesting observation which may be added at this point concerns the behavior of word-initial syllables. In general, initial syllables exhibit a strikingly high retention rate when compared with other atonic positions. And yet, in the case of the forms beginning with the prefix ex-, the rate of loss is almost 100%. The basis for this differential behavior follows from more general observations regarding the position of the initial vowel with respect to the word boundary. Word-internal vowels of the initial syllable remain intact, even when loss would create a structurally compatible cluster, although, as noted by Grandgent (1927: 39), 'in a few cases, the medial vowel of an initial syllable disappears, being swallowed up in the roll of an r or the hiss of an s'. When the vowel is also word-initial, however, the rate of its loss is much higher, not only in the case of the prefix ex-, but in all cases where a compatible cluster would result. The results compiled from the data collected for the present study are given in Table 5. Here the differential behavior between word-initial vowels and initial-syllable vowels in medial position is clearly seen, even though cases other than the prefix ex- were considered for word-initial vowels.

	pre-pre tonic #---	pre-pre-tonic #C---	pre-tonic #---	pre-tonic #C---
# of examples	15	14	30	35
# retained	10	13	18	33
% retained	67	93	60	94

Table 5: Italian initial vowels; permissable positions

3.3.3. Behavior of individual vowels. Also of interest to the study of phonological hierarchies is the differential behavior of the individual vowels themselves. As has been pointed out by many investigators, there is a great deal of variation in 'strength' among the various vowels of the Romance languages, and since the figures reported in Table 4 are based on the totality of examples collected, involving all vowels, certain sub-hierarchies have been obscured. Tables 6-8 give a breakdown by vowels of the various atonic positions under consideration, thus showing the pattern of positional hierarchies more clearly. The figures in parenthesis represent computations which, due to the small number of cases involved, are not significant. Since it appears that, before undergoing syncope, e was raised to i and o was raised to u, the pairs /e/:/i/ and /o/:/u/ could not be separated for discussion. However, since e was frequently weakened to i in Italian, while o was frequently, but not as often as was the case with e, raised to u, the data in Tables 6-8 tentatively point to the following vowel scale, based on resistance to syncope and raising:

a → o → e → u → i

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	1	7	18	13	24
# retained	1	7	18	12	23
% retained	(100)	100	100	92	96
# modified	0	5	5	0	1
% retained unmodified	(100)	29	72	92	92

Table 6: Italian /a/; permissable positions

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre tonic	1st pre-tonic
# of examples	2	99	20	9	21
# retained	0	23	7	7	19
% retained	(0)	23	35	78	90
# modified	0	1	1	0	4
% retained unmodified	(0)	22	30	78	71

Table 7: Italian /o/-/u/; permissable positions

	inter-tonic	post-tonic penult	second pre-tonic	lst pre-pre-tonic	lst pre-tonic
# of examples	2	41	27	7	20
# retained	1	26	7	4	9
% retained	(50)	63	26	57	45
# modified	0	18	4	2	4
% retained unmodified	(50)	19	11	29	25

Table 8: Italian /e/-/i/; permissable positions

3.4 The developments in Spanish

3.4.1. Compatible consonant clusters. All the consonants in Spanish may occur at the beginning of a word; however, Spanish tolerates no word-final consonant clusters (except in a few Latinized or borrowed forms), and rather limited possibilities for word-final consonants and clusters, as displayed below:

FINAL		INITIAL	
(b)		br	bl
(c)	[k]	cr	cl
d		dr	
j	[x]	fr	fl
l		gr	gl
n		pr	pl

r	tr	
s		(vl)
(t)		
z [θ]		

The consonant *b* occurs word-finally in modern Spanish in borrowed forms like *club* which, due to their high frequency of occurrence, may be considered as acceptable to the phonotactic structure of the language. However, word-final *b* did not occur in the earlier periods of the language which form the basis for the present discussion. Similarly, the initial cluster *vl-* occurs only in Slavic proper names, and may be excluded from further consideration. A further exclusion to be made concerns final *z*, currently a voiceless interdental fricative [θ] in Castilian, but which did not exist as such in the earliest periods of Spanish, being represented first by the proto-combinations *ti* and *di*, and later by the affricates [č] and [ž]. Final [x] (e.g. *reloj*, *boj*) did not exist in early Spanish, and is not pronounced in many dialects of modern Spanish. The word-final consonants *c* (*coñac*) and *t* (*cenit*, *carnet*) are found only in modern borrowings, and are often dropped in speech. Altogether, comparing the consonantal possibilties given above with the consonant distribution of Latin, and allowing for the homorganic assimilation of nasals before obstruents (e.g. *np* > *mp*), the following Latin clusters must be eliminated from consideration in early Spanish: *nks*, *rks*, *lks*, *ks*, *ps*, *mps*, *rps*, and clusters whose first member is *t*. A large number of these clusters were found in learned Classical Latin words and probably were not pronounced in late Vulgar Latin and early Spanish, so that by and large the overall consonant cluster distribution of Spanish is not radically different from that of Vulgar Latin, although the position of the syllable boundary in the interior of certain clusters has changed.

3.4.2. Behavior of atonic positions. By selecting only those words in which loss of a vowel would result in a phonotactically permissable cluster, one arrives at the results given in Table 9.

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	11	168	81	43	90
# retained	1	41	34	37	85
% retained	9	24	42	86	95

Table 9: Spanish atonic vowels; permissable positions

As in Italian, the hierarchical behavior of atonic positions is more clearly seen once only compatible environments are considered: strongest is the first pretonic syllable, closely followed by the initial pre-pretonic syllable; in an intermediate position is the word-internal pretonic syllable, while the posttonic penult and the intertonic syllables are diachronically quite weak.

The relative positional strength attached to the word-initial atonic syllables may be further highlighted by considering the difference in behavior between word-initial atonic vowels and initial syllable atonic vowels preceded by one or more consonants. The results of this further subcategorization are given in Table 10.

	pre-tonic #C---	pre-tonic #---	pre-pre-tonic #C---	pre-pre-tonic #---
# of examples	42	48	18	25
# retained	40	45	17	20
% retained	95	93	95	88

Table 10: Spanish initial vowels; permissable positions

The above figures clearly indicate the high degree of diachronic phonological strength attatched to initial atonic syllables in general. Cases where a word-initial vowel was lost may be generally attributed to wrong division or sinalefa effects caused by interaction with preceding words ending in a vowel, which frequently form multi-word patterns in spoken Spanish. Compared with the rate of loss of word-initial vowels exhibited by Italian, initial vowels fared comparatively better in Spanish. The main reason for this difference is clear: the great majority of cases in Italian in which a word-initial atonic vowel was lost involve reduction of the prefix ex- to s-. Spanish, on the other hand, does not tolerate word-initial clusters of s plus a following consonant, and consequently no initial vowel was lost if loss would produce such a cluster.

3.4.3. Behavior of individual vowels. The data collected for Spanish also allow for the study of the intrinsic phonological strength of the individual vowels. As in the case of the Italian vowel system, it is impossible, in Spanish, to separate the pairs /e/:/i/ and /o/:/u/, since a considerable state of flux existed in the earliest periods of the language. The general patterns of evolution involved the following transpositions: Latin *ī* > Spanish *i*; Latin *ĭ*, *ē* > Spanish *e*; Latin *ū* > Spanish *u*; Latin *ŭ*, *ō* > Spanish *o*. However, the general process of unstressed vowel weakening took the form of raising, with the result that *e* was at times raised to *i*, and *o* became raised to *u*, as in Italian. Moreover, the uncertain graphological practices exhibited by the earliest Spanish texts renders any exact identification of vowel timbre practically impossible. The only vowel which may be accurately identified from textual data is *a*, which generally persisted intact, unless raised to *e* by a process such as palatalization or vocalization; e.g. *făctum* > *feito* > *fecho* > *hecho*.

Breaking down the early Spanish vocalic system into the three categories /a/, /e/:/i/ and /o/:/u/, the individual behavior patterns characterizing these vowels are given in Tables 11-13.

	intertonic	posttonic penult	second pretonic	1st pre-pretonic	1st pretonic
# of examples	0	14	19	17	38
# retained		10	19	14	37
% retained		71	100	83	97

Table 11: Spanish atonic /a/; permissable positions

Table 11 manifests the inherent phonological strength characterizing the vowel /a/, a strength which has been noted by many investigators. The four cases of loss of *a* in the posttonic penult may be traced to the Vulgar Latin period,[4] where this vowel perhaps had taken on a more centralized articulation (e.g. *colăphus* > *colpo*); in any event, syncopation of *a* took place only during this time period. In the initial pretonic positions, all cases involving loss of *a* deal with a word-initial vowel, thus falling within the category of *sinalefa* phenomena. From these data, the vowel /a/ appears, except in unusual circumstances, to have been highly resistant to change or loss in Spanish, a situation persisting to the present day where, even in dialects in which the other atonic vowels are severely reduced, atonic *a* remains relatively secure.

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	9	71	47	8	20
# retained	0	9	13	5	19
% retained	0	13	28	62	95

Table 12: Spanish atonic /e/-/i/; permissable positions

Table 12 covers the evolution of the vowels /e/:/i/ in early Spanish. These vowels are much weaker than /a/, particularly in the intertonic, posttonic penult and word-internal pretonic positions. In the second-syllable pretonic position, when *e* was not lost, it was quite frequently raised to *i*, thus reinforcing earlier observations which classify *i* as a phonologically weakened version of *e*. Unlike /a/, atonic /e/:/i/ occasionally fell in the strong initial atonic positions, even when preceded by consonants.

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	2	80	25	18	35
# retained	1	5	5	18	34
% retained	(50)	6	20	100	97

Table 13: Spanish atonic /o/-/u/; permissable positions

In Table 13 the data concerning the rate of loss of the vowels /o/:/u/ are presented. In the initial atonic positions, the strength of these vowels is clearly demonstrated; in the one case of loss, the vowel in question was word-initial. In the posttonic penult, the data require a bit of additional interpretation, for in this position, *u* appears to have fared worse than *i*, in contradiction to the observations effected in Italian. Nearly all cases of loss of *u* in the posttonic penult involve words of the form *-Cŭlum*, in which the process of syncopation of the posttonic penult was already well established, and perhaps even completed, in Vulgar Latin. This process of syncope apparently led to the establishment of a series of canonical patterns, affecting any form ending in *-cŭlum*, *-bŭlum*, *-gŭlum*, etc. In fact, eliminating all such cases from the data leaves only six cases of /o/:/u/ in the posttonic penult, of which only one example was lost, for a total retention rate of 83%. While it would perhaps have been desirable to have eliminated all the forms in *-Cŭlum* right from the outset, there is no way of determining whether or not syncopation continued into early Spanish, and a failure to consider such forms would lead to circularity and excessively skewed results. As matters stand, the relatively few cases of u in the posttonic penult position not conforming to the pattern *-Cŭlum* indicate that this vowel is rather resistant to change, unless caught up in a more general pattern of syncopation such as that occurring in Vulgar Latin.

3.5 *The developments in Portuguese*

3.5.1. *Compatible consonant clusters*. Compared with Spanish and Italian, Portuguese exhibits a relatively simple and infecund set of co-occurrence possibilities for consonants. Prior to vowel nasalization, i.e. in the time period covered by the primary data which have been collected, Portuguese permitted only the following consonants in word-final position: *n*, *r*, *l*, and *s*. All occurring consonants were permitted in word-initial position. Even today, Portuguese permits no word-final obstruents other than *s* (pronounced [š] in most dialects), and borrowed words ending in an obstruent receive a final paragogic *e*: English *club*, *racket*, *team*, *sport* become *clube*, *raquete*, *time* and *esporte*, respectively.

In the time period before initial *cl*, *pl*, and *fl* were changed to *ch* (originally [č], currently [š]),[5] Portuguese permitted the following word-initial consonant clusters:

bl	br
cl	cr
	dr
fl	fr
gl	gr
pl	pr
	tr

3.5.2. Behavior of atonic positions. The rather limited set of cluster possibilities, combined with the total lack, in Portuguese, of word-final consonant clusters, severely limits the potential environments capable of sustaining vowel loss. Considering only these environments, and allowing for homorganic assimilation of nasals, the data were screened to sort out only those cases where loss of a vowel would produce a phonotactically compatible cluster. The results of this screening are given in Table 14.

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	15	131	59	41	105
# retained	4	16	34	35	98
% retained	27	11	58	85	93

Table 14: Portuguese atonic vowels; permissable positions

In the data collected, no vowels were lost in positions where an incompatible cluster would have resulted. Of the word-initial atonic positions, one example of loss in each category represents a vowel in initial position preceded by a consonant; the remaining cases of loss involve word-initial atonic vowels, again highlighting the differences in behavior caused by the presence of an initial consonant.

Table 14 demonstrates that initial atonic syllables are very strong, in terms of diachronic behavior, while the intertonic is relatively weak, with second-syllable pretonic vowels lying approximately on the midpoint in terms of diachronic strength. The relatively high figure for loss in the posttonic penult results from the practice, noted above, of generally making no distinction between loss or retention of vowels in this position which may be assumed to have occurred in the Vulgar Latin period and syncope occurring properly in the time period designated as old Portuguese. For this reason, the rate of loss of the posttonic penult given in Table 14 is undoubtedly too high. On the other hand, attempting to separate syncope in Vulgar Latin forms ending in -Cŭlum from cases in old Portuguese in which the intervocalic l was dropped leads to inescapable circularity, since it appears that, for a certain time at least, the two processes operated concurrently. However, by eliminating all Latin forms in -Cŭlum, there remain 53 permissable cases involving the posttonic penult syllable, of which 39 were lost for a total retention rate of 27%. This augmented figure is probably closer to the actual rate of syncope of the posttonic penult in early Portuguese, but, given the complete indeterminacy surrounding the question of relative chronology, an accurate figure is impossible to obtain. Moreover, if one further excludes from the data all those cases signalled by Williams in which the vowel was lost in Vulgar Latin, virtually no acceptable cases remain, and the results, in addition to being totally circular, approach the level of tautology, since one is merely echoing the fact that vowels were only lost in phonotactically permissable positions.

3.5.3. Behavior of individual vowels. Breaking down the results reported in Table 14 into the various vowels under consideration yields the figures given in Tables 15-17. Table 15, despite the relative scarcity of examples, illustrates the inherent diachronic strength of the vowel /a/ in terms of resistance to syncopation.

In this context, it would be interesting to know the relative chronology of the raising of atonic a with respect to the raising of atonic o and e; unfortunately, no information is available to shed light on this problem. Indeed, the entirety of the raising of atonic e and o seems to have been arrived at through a combination of purely phonetic factors and morphological confusion,[6] which renders any accurate time tracing impossible. Based purely on the inherent strength of the vowels as measured by their diachronic resistance to syncope and other forms of weakening, one would advance the hypothesis that atonic e was raised first, followed by o, and finally by a.[7]

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	2	9	20	24	53
# retained	2	8	19	21	52
% retained	(100)	89	95	62	98

Table 15: Portuguese atonic /a/; permissable positions

	inter-tonic	post-tonic penult	second pre-tonic	1st pre-pre-tonic	1st pre-tonic
# of examples	9	46	29	4	22
# retained	1	6	9	3	17
% retained	11	13	31	80	77

Table 16: Portuguese atonic /e/-/i/; permissable positions

	inter-tonic	post-tonic penult	second pre-tonic	first pre-pre-tonic	first pre-tonic
# of examples	4	82	10	6	30
# retained	1	7	6	4	30
% retained	25	9	60	67	100

Table 17: Portuguese atonic /o/-/u/; permissable positions

Comparison between Tables 16 and 17 reveals, in most environments, the relatively greater phonological strength of /o/:/u/ as opposed to /e/:/i/. As in the case of Spanish, the outstanding majority of cases of syncope of the vowel *u* involve Latin forms with the final configuration -*Cŭlum*. Removing such forms from consideration leaves only six examples of /o/:/u/ in the posttonic penult position, of which two were retained, for a total retention rate of 33%. This figure, while not statistically significant in its own right, due to the small number of cases involved, suggests that, in most cases, the vowels /o/:/u/ exhibit a much greater intrinsic phonological strength than is reflected in Table 17.

3.6 The question of open syllabicity

3.6.1. *Introduction*. The question of the role of phonotactic factors in accounting for the data reported above is still not closed, for there is a further ramification of the notion of structural compatibility. Spurred predominantly by the work of Pulgram (1970), a great deal of investigation has gone into the matter of relating consonant clustering to *open syllabicity*. Pulgram has claimed that there exists a universal or quasi-universal tendency which requires languages to strive for maximum degrees of open syllabicity; that is, syllables terminating in a vowel. Open syllabicity is of necessity determined in terms of the possible word-initial and word-final clusters of the language in question: if a cluster can begin a word it can begin a syllable. In the event that open syllabicity is not possible, Pulgram suggests the 'principle of minimal coda and maximal onset' whereby the syllable boundary is placed in such a fashion as to minimize the number of consonants to the left of the boundary.

Several of Pulgram's students studied the Romance languages in order to put his theory to the test. The study of Italian was undertaken by Tai Whan Kim (1965) who claimed (pp. 7-8): 'I maintain that as many syllables as possible must be open, that is, end in a vowel, except when the rule of opening the syllable would create non-permissable prepausal or postpausal clusters'. Needless to say, the author of this statement finds himself in a difficult position when approaching the matter of geminate consonants in Italian, many of which developed from originally single consonants; the best that is offered is a suggestion that geminates somehow do not close a syllable as 'completely' as heterogeneous clusters.

Klausenburger (1972), who attempted to apply Pulgram's theory to the diachronic phonotactics of French, also encountered an insurmountable obstacle when considering the prothetic *e* which arose before initial clusters beginning with *s*, the so called *s impura*.[8] In French, the *s* was eventually lost, thus creating an open syllable; e.g. *scŏlam* > *escole* > *école*. However, as Klausenburger notes (p. 48):

> If one considers the starting point and the final point of these changes, one can say that the role of the prothetic vowel was to reduce three-member postpausal clusters to two-member postpausal clusters, two-member postpausal clusters to single consonants, removing the initial /s/. The beginning and end of these developments show phonotactic restructuring only in that the /s/ clusters were lost. But in OF ... these consonant groups were all sequences, with the syllable boundary after the /s/. Therefore, at the OF stage, there occurred a restructuring as the prothetic vowel converted postpausal clusters into sequences.

Moreover, in Spanish and Portuguese, the prothetic vowel e has remained as well as the s, resulting in permanently closed syllables, although the modern tendency in Spanish for syllable-final s to weaken or disappear may indicate the beginning of a belated return to open syllabicity.

On other grounds, however, Pulgram's theory represents an empirical proposal with respect to the question of open syllabicity, and as such may be tested against the corpus of data used in this study. The prediction which would be made by this theory is that the rate of vowel loss should be higher in environments which would retain or promote open syllabicity than in environments which would merely yield dissolvable clusters or sequences. With an eye toward testing this hypothesis, and thereby eliminating another potential variable from the study of positional hierarchies, all the environments in which a vowel loss would result in an open syllable were culled out of the data, and individual computations performed.

3.6.2. Open syllabicity in Italian. The comparative results for Italian are reported in Tables 18-21, where the notation 'cc' means compatible clusters only, and 'os' refers to environments in which loss would produce an open syllable.

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	11	7	147	98	67	24
# retained	2	0	56	34	33	9
% retained	18	0	31	34	49	38

Table 18: Italian atonic vowels; open syllables

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	1	0	7	7	18	5
# retained	1		7	7	18	5
% retained	(100)		100	100	100	100

Table 19: Italian /a/; open syllables

The figures are not striking. In no case is there a significant preference for open syllabicity, and in some cases even the opposite tendency may be suggested. There must, consequently, exist other factors which counteract the drive toward open syllabicity in Italian, if in fact any such drive exists.

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	2	3	99	81	20	14
# retained	0	0	23	19	7	5
% retained	(0)	(0)	23	23	35	36

Table 20: Italian /o/-/u/; open syllables

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	2	4	41	9	27	5
# retained	1	0	26	8	7	1
% retained	(50)	(0)	63	89	26	20

Table 21: Italian /e/-/i/; open syllables

3.6.3. Open syllabicity in Spanish. As regards initial consonant clusters, the syllabic structure of Spanish is substantially different from that of both Latin and Italian, since Spanish tolerates no word-initial clusters of the form sC-, but prefixes a prothetic e- to any such clusters which may arise. By means of this process of prothesis, the s of the cluster becomes syllable-final; thus stāre #sta+re# becomes estar #es+tar#. As noted by Klausenburger, the rise of this prothetic vowel stands in marked contradiction to the theory of maximum open syllabicity, since by transferring the s from syllable-initial to syllable-final position, a closed syllable is created. Many Spanish dialects weaken syllable-final s to an aspiration [h];

thus *estar*>[ehtár], thereby possibly laying the groundwork for a future return to open syllabicity along the lines followed centuries ago by French. Without additional evidence, however, it is impossible to claim that this aspiration is teleologically caused by the desire for open syllabicity, rather than by a purely physiological weakening of consonants in an inherently weak position. In Puerto Rico, Cuba, Andalucia, and sporadically in parts of Central and South America, syllable-final *l* and *r* are often interchanged, due to their acoustic similarity, and are sometimes neutralized to an indeterminate liquid segment which is neither clearly lateral nor clearly vibrant.[9] The weakening occurs only in syllable-final position, by virtue of the weak implosive articulation of segments in this position, and in the case of *l* and *r* involves no change in syllabicity. The same may be said for the vocalization of syllable-final *l*, occurring in Latin, old French, and modern Portuguese, or of the vocalization of syllable-final *r* in Cuba and other Caribbean areas (e.g. *porque* >[pojké]). The syllable-final position seems to be an inherently weak phonetic configuration for consonants, and to claim that syllable-final consonants are weakened or dropped in order to achieve maximum open syllabicity is to enter into a totally circular discussion, since it is precisely the weak articulation of syllable-final consonants that appears to be at the root of changes to open syllabicity. In the particular case of Spanish prothetic *e-*, if the drive for maximum open syllabicity were a strong one, the process of prothesis would probably never have been initiated in ths first place, or conceivably, although not very likely, the prothetic vowel would not have attracted the initial *s* of the clusters to its own side of the syllable boundary.

Leaving aside for the moment the question of prothetic vowels in Spanish, it is possible to consider those word-internal cases where loss of a vowel would have produced an open syllable. The comparative computations are reported in Tables 22-25.

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	11	1	168	69	81	18
# retained	1	1	47	5	34	7
% retained	9	(100)	24	7	42	39

Table 22: Spanish atonic vowels; open syllables

In Table 22, the meaningless figure reported for the intertonic syllable must be disregarded. In the case of the posttonic penult syllable, the rate of retention appears to have been significantly lower in cases where an open syllable would be produced than in cases where only compatible clusters would result, without further considerations of syllabicity. In the case of the second syllable pretonic position, the rate of loss was only slightly higher when open syllables would have resulted than when only compatible clusters were considered, but it is not obvious that this difference is meaningful.

In Tables 23-25 the question of open syllabicity is broken down by the individual vowels.

	intertonic	posttonic penult		second pretonic	
		cc	os	cc	os
# of examples	0	14	1	19	1
# retained		10	0	19	1
% retained		71	(0)	100	(100)

Table 23: Spanish /a/; open syllables

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	9	0	71	12	47	9
# retained	0		9	2	13	3
% retained	0		13	17	28	33

Table 24: Spanish /e/-/i/; open syllables

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	2	1	80	56	25	8
# retained	1	1	5	2	5	3
% retained	(50)	(100)	6	4	20	38

Table 25: Spanish /o/-/u/; open syllables

Due to the dilution of the results produced by this breakdown, it is impossible to obtain any figures for the vowel /a/. In the case of the pair /e/:/i/, by considering only cases of potential open syllabicity, the rate of retention is actually *higher* in the posttonic penult and second syllable pretonic positions than in cases where only compatible clusters were considered. The same conclusion holds for the pair /o/:/u/ in the second-syllable pretonic position. In the posttonic penult, the rate of retention of /o/:/u/ is slightly less when only open syllables are considered, but this distribution again reflects the skewing of the data by the predominant forms in *-Cŭlum*, in which loss of a vowel would result in an open syllable. This in turn accounts for the apparently low rate of retention for the posttonic penult in Table 23, since cases of loss of the posttonic penult vowel of *-Cŭlum* forms account for the majority of the cases found in this table.

Taken together, the results from Spanish indicate that the drive for open syllabicity evidently did not play a significant role in the diachronic evolution of Spanish through syncope, where general factors of structural compatability appear to have taken precedence. Even in modern Spanish, there is no evidence of a concerted drive toward open syllabicity; clusters which are not structurally compatible, and which result in closed syllables, are tolerated throughout the language in borrowed forms: e.g. *zinc*, *torax*, *actual*, *extra*, *abstracto*, *vals*, *instrumento*, etc.

3.6.4. *Open syllabicity in Portuguese*. Portuguese, like Spanish, permits no initial clusters beginning with *s*, which severely limits the possibilities for syllable onset patterns. The figures in Table

26 indicate the comparative rate of loss of atonic vowels in conditions conducive to open syllabicity as opposed to the sole requirement of phonotactic compatability.

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	15	5	131	68	59	8
# retained	4	1	16	7	34	5
% retained	27	20	11	10	58	63

Table 26: Portuguese atonic vowels; open syllables

In Tables 27-29, these data are further broken down by vowels, but due to the small number of examples, no meaningful results may be obtained, except in the case of /o/:/u/.

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	2	0	9	1	20	0
# retained	2		8	1	19	
% retained	(100)		89	(100)	95	

Table 27: Portuguese /a/; open syllables

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	9	1	46	4	29	3
# retained	1	0	6	2	9	2
% retained	11	(100)	13	(50)	31	(67)

Table 28: Portuguese /e/-/i/; open syllables

	intertonic		posttonic penult		second pretonic	
	cc	os	cc	os	cc	os
# of examples	4	4	82	63	10	5
# retained	1	1	7	5	6	3
% retained	(25)	(25)	9	8	60	60

Table 29: Portuguese /o/-/u/; open syllables

In the case of the pair /o/:/u/, almost exactly the same rate of retention appears, whether only open syllabicity is considered, or whether the results are evaluated in the more general context of phonotactic compatability. From these figures it must be concluded that the theory of maximum open syllabicity has not been confirmed by the data from Portuguese, although in view of the relative paucity of acceptable examples, it must be conceded that the theory has not been disconfirmed either.

3.7 Possible physical correlates

The data which have been collected indicate that the early history of Italian, Spanish and Portuguese was categorized by a hierarchical behavior of atonic vowel positions, as well as of individual vowels. The question still remains, however, of the basis for such differential behavior. Since the notion of diachronic hierarchies may be introduced at the phonological level, it is not essential to the argument of this study that any attempt be made to determine the physical or empirical correlates of such phonological indices. Indeed, it is impossible to offer any empirical evidence whatsoever, except for the contemporary languages, which do not necessarily bear any resemblance to earlier stages of the same languages. On the other hand, in Chapter Five an attempt will be made to show the action of the phonological hierarchies described above during a later period of the Italian language, which presupposes a relatively constant phonotactic configuration throughout the time span in question. If it could somehow be demonstrated that one or more of the modern Romance languages also exhibits essentially the same hierarchical arrangement of atonic positions isolated for their earlier periods, it would be possible to infer the continued existence of this hierarchy over a larger segment of the diachronic axis, and would further support claims referring to intermediate periods. At the present time, given the almost complete lack of data on the physical correlates of phonological hierarchization, it is not immediately obvious exactly what parameters should be studied in order to approach the question. There is probably some sort of articulatory basis for the proposed hierarchies, since it is by means of spoken utterances that the various sound changes which point to them have been realized. On the other hand, the hierarchy probably also has a set of psycho-acoustic correlates, in view of the inherent auditory feedback present in all normal individuals.

In view of the near impossibility of obtaining any meaningful articulatory data, it was decided to attempt a rudimentary study of the acoustic properties of atonic vowels in modern Spanish and Italian. Unlike Spanish and Italian, the prosodics of Portuguese have undergone a substantial change since the early periods, since beginning with the 16th century, it has been subjected to an increasingly strong stress accent, causing a high rate of syncope and apocope not yet recorded in the orthography, except in a few forms such as para > colloquial pra.[10] In consequence, little would be gained by undertaking a phonetic survey of modern Portuguese, since the modern dialects, as well as being highly diversified among themselves, are not an accurate reflection of the earlier periods of the language. Therefore, the diachronic data must stand as the sole testimony of phonological hierarchization in Portuguese.

In keeping with the traditional assumptions about hierarchies of atonic position, length and intensity of the vowels in question were regarded as the experimental variables. The data were provided by two educated speakers of standard Italian (Tuscan) and two educated speakers of Castilian. Each speaker was asked to read a list of words, carefully selected so as to provide all the required environments in the shortest period of time. The informants were recorded in a studio, utilizing high quality recording equipment.[11] Each vowel in a key environment was either word-initial followed by a voiceless consonant, word-final preceded by a voiceless consonant, or word-medial surrounded by voiceless consonants. This was done in order to eliminate spurious lengthening effects caused by the proximity of voiced segments, and also to ensure that the vowels (as voiced segments) could be clearly observed on the tracings. While it would have been desirable to utilize a greater number of subjects, the results obtained from the informants converge in such a fashion as to suggest non-randomness of results. Each word was read twice by each subject, to ensure that no production errors had inadvertently been recorded into the data. The figures presented below represent the arithmetic mean of the results obtained on each of the two trials, except where a production error, such as a voiceless or deleted vowel, made such a computation impossible. In all cases except those involving actual errors, the values for each of the two trials were sufficiently close as to make the arithmetic mean a significant figure. When more than one figure appears in a given box, it is because the set of words used as test tokens offered more than one example of a particular environment. In general, an attempt was made to study the behavior of the vowels a, e, i, o and u in the initial pretonic, initial pre-pretonic, second syllable pretonic, and posttonic penult positions. As a cross-check on these figures, measurements were made of the stressed vowels and final vowels; however, these figures are not presented in the tables below, but merely serve as part of the verification for the data of central relevance.

Once recorded, the tapes were subjected to an analysis on the Mingograf.[12] The Mingograf is a device which records, by means of a set of inked styli, various aspects of an incoming audio signal on a moving roll of paper. Four tracks are provided: the fundamental frequency or voicing track, unfiltered intensity, filtered intensity, and an oscillogram of the entire audio signal served as input. The time base at which the material is recorded on the paper may be set, thus allowing a ready measurement of segmental length; in the present case, a time base of 50 mm/sec. was found to be adequate. It is also possible to run a calibration of intensity for each tape that is played through the Mingograf, permitting relative differences in intensity to be computed with a high degree of accuracy.

Vowel length was measured in terms of the fundamental, or voicing band, and cross-checked with the intensity bands, thus necessitating that each vowel be placed in the vicinity of voiceless segments. Intensity was computed through the filtered intensity track, and cross-checked against the other tracks. The oscillogram was not utilized at all, except as an additional check on the time base. The results for speaker A (an Italian woman) are shown in Tables 30 and 31; those for speaker B (an Italian man) in Tables 32 and 33; the data for speaker C (a Spanish woman) are found in Tables 34 and 35, while those for speaker D (a Spanish man) appear in Tables 37 and 38.

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	95/100	105	100	90/90
e	100	80		
i	80/90	100	70/75	80
o	120/100	80	100	80
u		70	70	

Table 30: Speaker A (Italian); vowel length in ms.

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	4/5	4	7	5/5
e	5	2/2		
i	6	6	11/12	9/9
o	6/7	2	4	4/6
u			12/7	4/6
mean	5.5	3.5	9	6

Table 31: Speaker A (Italian); vowel intensity in db. down

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	90/90	110	110	70/70
e	90	80		
i	70	70	100	60
o	70/70	100	75	70/70
u				

Table 32: Speaker B (Italian); vowel length in ms.

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	1/3	2	5	6/4
e	5	1/2		
i	2	3	6/9	6/6
o	2/5	2	7	6/5
u			9/9	
mean	3	2	7.5	5.5

Table 33: Speaker B (Italian); vowel intensity in db. down

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	90	60	65	70
e	110	80	60	70
i	100	90	80	70
o	90	110	80	60
u	90	70	65	55

Table 34: Speaker C (Spanish); vowel length in ms.

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	2	3	6	10
e	3	4	10	8
i	2	2	9	11
o	2	3	10	11
u	3	5	9	10
mean	2.4	3.4	8.8	10

Table 35: Speaker C (Spanish); vowel intensity in db. down

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	90	60	65	70
e	70	85	60	60
i	80	75	65	60
o	80	90	65	65
u	70	80	60	55

Table 36: Speaker D (Spanish); vowel length in ms.

	initial pre-pretonic	initial pretonic	second pretonic	posttonic penult
a	6	6	10	11
e	5	6	11	10
i	5	5	13	12
o	3	3	10	10
u	3	4	11	10
mean	4.8	4.4	11	10.6

Table 37: Speaker D (Spanish); vowel intensity in db. down

From these tables it may be seen that no significant correlation in terms of vowel length may be observed with respect to the various atonic environments; indeed, in many cases the longest vowel was the final unstressed, while the shortest vowel was the tonic. In Italian and Spanish, vowel length is largely determined by the kind and number of following consonants,[13] and hence appears to have little to do with the hierarchical behavior of unstressed vowels.

Turning now to the relative intensity of the unstressed vowels, it may be seen that there is indeed a correlation based on the various atonic positions. The figures reported are in decibels down from the intensity of the tonic vowel. The figure in decibels, a measure of the relative intensity of two signals, is ten times the common logarithm of the ratio of their powers. That is, given two signals S_1 and S_2, with powers P_1 and P_2, respectively, the difference in decibels between S_1 and S_2 is expressed by the formula:

$$\text{db}=10 \log_{10} \frac{P_1}{P_2}$$

Thus, for example, a figure for an unstressed vowel of -10 db. means that the stressed vowel has ten times as much power as the unstressed vowel, a figure of -9 db. means the stressed vowel has approximately 7.9 times as much power, a figure of -3 db. means that the stressed vowel is approximately 1.99 times as powerful, etc. From these figures it is seen that there exists a clear hierarchical tendency with respect to relative intensity, with the initial pretonic syllable being the strongest, followed closely by the initial pre-pretonic, and then by the remaining positions. These differences in relative intensity are striking enough to be of some significance, since they demonstrate, in a rudimentary fashion to be sure, the considerable difference in acoustic power between the various atonic environments in Italian and Spanish, thus hinting at one possible physical correlate for the hierarchical behavior of these environments. These results are non-conclusive, but they do lend support to the common suspicion that hierarchies of position are somehow related to relative intensity.

As an aside at this point, it may be added that, in contrast to the rather consistent behavior displayed by vowels in other positions, final atonic vowels displayed a tremendous range of variation, with relative intensity figures ranging from -2 db. to -9 db., in an apparently random fashion. These figures again highlight the fact that the behavior of final atonic vowels in Italian and Spanish is dependent upon more than purely physical correlates, perhaps in view of the morphological functions carried out by vowels in this position.

It may also be noted that there is no significant correlation between vowel timbre and either length or intensity, thus implicating possible articulatory factors in the determination of the relative intrinsic strength of the individual vowels. Bull (1965: 71) noted the following, in regard to the Spanish vowels:

> The so-called degree of audibility of vowels is entirely irrelevant to their phonemic function. The [i] of _pino_ is heard just as clearly as the [o]. The phonemic contrast between _puso_ and _piso_ is just as clear as the contrast between _puso_ and _puse_. The strength of a vowel is not a phonetic feature which can be related to its phonemic function.

While these remarks are to a certain degree justified by the lack of correspondence between vowel timbre and such concomitants as length and stress, it is still true that, from a perceptual point of view, there do indeed exist differences between the various vowels, as pointed out, for example, by Navarro Tomás (1971: 27):[14]

> A las vocales más perceptibles (_a_, _o_, _e_) se les suele llamar _fuertes_ y _llenas_, y a las menos perceptibles (_i_, _u_) _débiles_; la naturaleza de la perceptibilidad no tiene relación ninguna, sin embargo, con la idea de fuerza o intensidad articulatoria que estas denominaciones sugieren.

Moreover, perceptual differences clearly exist between stressed and unstressed syllables, and between the various atonic positions, but from a strictly phonemic point of view, the mere presence of a vowel in such a position is sufficient to place it in phonemic opposition with the other segments which could potentially occur in the same environment.

Notes to Chapter Three

1 The complete study is Anderson (1963). Earlier definitions of phonotactic compatibility are found in Saporta and Olson (1958), Fischer-Jørgensen (1954) and Vogt (1954).

2 Cf. Tai Whan Kim (1965: 31-2).

3 Cf. Devoto (1930) and Brøndal (1940) for a more detailed treatment of the origin, evolution, and contemporary manifestations of the Latin prefix *ex-* in Italian.

4 Cf. Grandgent (1934: 101) and Menéndez Pidal (1966: 76-7).

5 For a complete survey of the evolution of initial *pl*, *cl*, and *fl* in Portuguese, see Malkiel (1963-64).

6 Cf. Naro (1971b) for some considerations concerning the possible routes of evolution leading to the modern raised variants.

7 A possible example may be provided by vulgar Puerto Rican (and some dialects of Cuba) in which atonic *e* is frequently raised to *i*, while atonic *o* is never affected. Thus, for example, the inhabitants of the town of Lares, in Puerto Rico, refer to themselves as "di Lari". See also Navarro Tomás (1948), Malaret (1955: 27-9).

8 Other problems both general and specific, engendered by Klausenburger's treatment of French phonotactics, are noted in Rochet (forthcoming).

9 See, for example, Alonso and Lida (1945), Robe (1959), Matluck (1960) and Zamora Vicente (1967).

10 Cf. Williams (1962: 58).

11 Thanks are due to the staff of the language laboratories at the University of Alberta for permission to use their recording studio, and for assistance with the recordings.

12 The Mingograf was made available through the courtesy of the Department of Linguistics of the University of Alberta.

13 For Spanish, see Navarro Tomás (1916, 1917). For Italian, cf. Josselyn (1900), Metz (1914), Gregorio (1932), Parmenter and Carmen (1932), and Rosenzweig (1965).

14 For English, similar data are offered by Wickelgren (1965).

CHAPTER FOUR
FINAL VOWELS AND THE EVIDENCE FROM CATALAN

4.1 Introduction

The preceding chapters have served to establish certain hierarchies observable among the various atonic vocalic positions comprising words in early Spanish, Italian and Portuguese. From the relatively high degree of congruence of results which emerges from a consideration of these three languages, one is led to believe that investigation of additional Romance languages would yield comparable data, given the common denominator of Latin. The potential action of this diachronic strength hierarchy has been signalled in various word-internal positions, where it has been seen that differences in intrinsic phonological strength may manifest themselves in a highly differential behavior of segments occupying the positions in question, thus accounting for otherwise puzzling events. The rudimentary phonetic observations which have been presented suggest that, in most cases, relative phonological strength of atonic vowels is rather closely related to their relative intensity with respect to the tonic vowel. Throughout the course of the preceding chapters, however, there has been one consistent exception made to all observations and measurements; namely, the final atonic vowels. Final vowels were not included in the computations of rate of loss or retention, since it was asserted that additional factors, probably of a grammatical nature, had prevented vowels in final position from participating in events generally characterizing the fate of atonic vowels in other positions. Moreover, phonetic data concerning final atonic vowels showed an extreme degree of variability with respect to relative intensity, and the relative intensity of final vowels was generally much lower than would be anticipated in view of their diachronic phonological behavior, which affords final vowels a very high position on the strength scale. It now remains to explore in somewhat greater detail the relationship between the diachronic phonological hierarchy already isolated and the inherent strength apparently enjoyed by final atonic vowels in the Romance languages under consideration.

4.2 *The fate of final vowels*

For the sake of point-by-point comparison, it is useful to reiterate some of the facts which have been stated in earlier chapters regarding the behavior of final atonic vowels. In addition to the three languages which have been discussed up until this point, a fourth language, Catalan, will be included in the comparisons, in order to place the data from the other three languages in a clearer perspective.

In Italian, as has been noted, Vulgar Latin final vowels were generally preserved intact, although with various phonetic modifications depending on the dialect and on the time period involved. Exceptions to this general statement are quite frequently the result of haplology,[1] (e.g. *piede* > *piè*, *mercede* > *mercè*) or a consequence of being found in the middle of a breath group (*amor mio*, *ben bene*). It is, of course, noteworthy that in many regional Italian dialects, final atonic vowels have been lost, or have persisted only as the merest hint of an audible segment. This matter will be briefly returned to below. In the majority of cases, it was final *e* which was lost in standard Italian, although in a few established cases, the vowel *o* was also lost, in the middle of a syntactically-united breath group as in *buon*, *bel*, *quel*, *andiam via*, etc.

In Spanish, final atonic vowels remained intact as a general rule, with the exception of final *e*. Spanish final *e* regularly fell after intervocalic *c*, *d*, *l*, *n*, *r*, *s*, and *t*, remaining in other cases. In a few cases, final *o* was lost, possibly through the action of additional factors; the most well-known case is *ministerĭu* > *menester*. Final unstressed *a*, in keeping with its overall behavior as the diachronically 'strongest' vowel, remained in Spanish.

In Portuguese, final vowels were, as a rule, retained more frequently than in Spanish; however, final *e* usually fell after intervocalic *l* (in the Vulgar Latin period), *n* (in the Vulgar Latin period), *r*, *s*, and *c*.[2] Later developments, however, served to severely reduce final (and non-final) atonic vowels; *a* is generally reduced to [ɐ] throughout the Portuguese-speaking world, unstressed *o* reduces to [u], while unstressed *e* becomes [ə] in European Portuguese and [i˗] in most areas of Brazil. In the modern dialects, the reduced forms of *e* and *o* are weakly articulated, and both often fall in casual speech.[3] The tendency toward vowel reduction appears to be more dominant in European Portuguese, while the phonetically more conservative dialects of Brazil tend to put greater articulatory energy into the pronunciation of atonic vowels. In the Carioca dialect of Rio de Janeiro and its environs, however, the relative strength of the tonic syllable is rapidly increasing, with the result that initial and final atonic vowels are frequently truncated in rapid pronunciation.[4]

4.3 Atonic vowels in Catalan

Catalan[5] provides a striking contrast to the developments just mentioned. It was not included in the primary data computations for two interlocking reasons. First of all, Catalan has, by virtue of its political and geographical history, been strongly influenced by Spanish, as well as by Italian, Provençal and French, thus rendering accurate etymological tracing impossible in many instances. Second, and perhaps as a consequence of the first reason, a long controversy, still far from resolved, has raged over whether Catalan should be classified as Ibero-Romance, together with Spanish, or as Gallo-Romance, along with Provençal. The result of this dispute has been a series of conflicting, restrictive, and highly opinionated works on the Catalan language, which makes it extremely difficult to trace its linguistic history free from extraneous considerations. These two factors combine to yield a lack of sufficient etymological data upon which a statistical investigation could be based. Nonetheless, since the considerations to be offered in the present chapter are placed on the morphological plane, and since they deal primarily with synchronic considerations, Catalan data may be profitably utilized to provide an instructive contrast.

Final vowels generally fell in Catalan, with the exception of *a*, which survived, reduced to [ə] in most dialects; e.g. *dŏmna* > *dona*, *pŏrta* > *porta*, *caelu* > *cel*, *canto* > *cant*, *dulce* > *dolç*, *oclu* > *ull*, *nascere* > *nàixer*, etc. There are, however, a few well-defined exceptions in which the final vowel was preserved. Final *e* was preserved after the *muta cum liquida* combinations stemming from Vulgar Latin: *acru* > *agre*, *fratre* > *frare*, *masclu* > *mascle*, *libru* > *llibre*, etc. Final *e* also remained when the fall of the posttonic penult turned proparoxytones into paroxytones:[6] *comĭte* > *comte*, *decĭmu* > *deume*, *hŏspĭte* > *hoste*, *medĭcu* > *metge*, *paupĕru* > *pobre*. Final vowels were also preserved after *rr*, most probably in order to preserve the trilled sound: *ferru* > *ferre*, *turre* > *torre*, *verre* > *verre*, and so forth.[6] Final *u* in hiatus with a preceding vowel remains to preserve the diphthong: *Deu*, *meu*. The preceding examples show that Catalan is characterized by a significantly higher rate of loss of final atonic vowels than the other three languages previously considered, conserving the final vowels in general only as a phonotactic 'support' for a preceding consonant cluster. This high rate of loss is not confined to the final position, but is characteristic of the entire language, in all diachronic positions, in a manner strongly supportive of the diachronic strength hierarchy isolated for Spanish, Italian and Portuguese.

First-syllable atonic vowels in Catalan remained in nearly all cases, whether pretonic or pre-pretonic. There were, however, a number of phonetic modifications, depending upon the timbre of the vowel and the following segments.[7] Second-syllable pretonic vowels fared much worse, sharing, in fact, a fate comparable to that of final atonic vowels. The vowel *a* was usually conserved in second-syllable position (although reduced to [ə] in the eastern mainland dialects and in the Baleares): *calamellu* > *caramell*, *paradisu* > *paradís*. The other vowels usually succumbed to syncopation: *farinarǐu* > *farner*, *bonitāte* > *bondat*, *cerebellu* > *cervell*, *pectorale* > *pitral*, *laborare* > *llaurar*, etc. Once again, however, there are a number of well-defined cases of retention of internal pretonic vowels. This vowel was preserved when, according to Moll (1952: 97) 'de su desaparición resultaría un grupo de consonantes difícil de pronunciar': *avellana* > *avellana*, *hortulanu* > *hortolà*, *petricosu* > *pedregós*, etc. It becomes apparent by considering the data in greater detail than is possible in this brief survey that

Moll's statement is equivalent to the phonotactic compatibility of consonant clusters, providing the same general patterns observed in the other languages under discussion.

Internal pretonic vowels other than *a* were preserved before or after *n*: *examinare* > *eixamenar*, *lenicare* > *llenegar*. The reasons for this particular situation are not clear, and will not be considered here.

Morphological considerations appear to have prevailed in preserving internal pretonic vowels in forms followed by a derivational suffix, as stated by Moll (1952: 98): 'por conservarse el sentimiento de la vocal del primitivo'; e.g. *dormitorĭu* > *dormidor* (cf. *dormír*), *molinarĭu* > *moliner* (old *molner*; cf. *molina*), *sentire+mentu* > *sentiment*, *traditore* > *traïdor*, etc. In the verbal endings -*icāre*, -*ināre*, and -*ulāre*, basically the same sort of considerations must have operated; Moll (1952: 98) believes the internal pretonic was conserved 'por la analogía de sus primitivos': *carricare* > *carregar* (presumably influenced by *càrrec* and *càrrega*); *terminare* > *termenar* (influence of *terme* and *térmens*); *termulare* > *tremolar* (by analogy with *trémol*).

In those cases where more than two atonic vowels preceded the tonic syllable, it was generally the atonic vowel closest to the accented one which fell:[8] *amicitate* > *amistat*, *recuperare* > *recobrar*, *cominitiare* > *començar*, etc. This pattern is in keeping with the relative placement of the secondary tonic which has been observed in the other languages which have been studied.

The fate of the posttonic penult in Catalan is somewhat more complex, and the details will be omitted from the present discussion.[9] Offering a reasonably accurate generalization, it may be stated that a was never lost in this position, while the remaining vowels consistently fell, unless checked by considerations of phonotactic compatibility. We have, for example, anăte > ànec or àneda, asparăgu > espàrec, orgănu > orgue, scandălu > escàndel (modern escàndol), opposed to cinĕra > cenra, debĭtu > deute, arbŏre > arbre, lepŏre > llebre, popŭlu > poble, and so on. The vowel e was preserved in most cases where a nasal cluster or a cluster of the form Cn would result: cophĭnu > cove, fraxĭnu > freixe, homĭne > home, etc. Occasionally, it is also possible to discover the competition of two processes: apocope of the final vowel and syncope of the posttonic penult; realization of both processes would have produced a monosyllabic form replete with consonant clusters, and so in most cases only one of the processes operated on any given form, as noted above. Several examples of the triumph of syncope over apocope have already been given; some examples of the opposite development are: nubĭlu > núvol, strigĭle > estríjol, apostŏlu > apòstol, pisŭlu > pèsol, *trifŏlu > trévol.

This historical panorama of the Catalan atonic vowels is clearly no substitute for the statistical analyses which have been undertaken for the other languages, but it does offer a number of general conclusions of comparative interest. First of all, it may be seen, by considering a larger cross-section of data than that contained in the above examples, that the vowel a was by far the 'strongest' in the history of Catalan, followed by o (now reduced to [u] in most dialects) and finally by e (also generally reduced), thus conforming to the vocalic strength hierarchy isolated for the other Romance languages. Moreover, the overall rate of loss of unstressed vowels was much higher than in Italian, Spanish, and Portuguese, creating a large number of clusters ; thus, Entwistle (1961: 84) remarked:

> If we compare Spanish with Catalan we are at once aware of a difference in the form and accentuation of words. Catalan is more abrupt. Both languages share the strong tendency of Western Romance to eliminate unaccented vowels which fall between one accented syllable and another, but Catalan has carried through this change more thoroughly than Castilian.

Thus, the loss of final vowels in Catalan is a manifestation of a much more general process; it remains to be seen, however, what consequences these developments might pose for a more complete theory of diachronic phonology.

4.4 Preservation of morphological material

It is fundamental to the tenets of functional-structural linguistics, and more recently, of generative grammar,[10] that morphological considerations may often intervene to check the flow of otherwise regular sound changes.[11] It is not necessary to reopen the time-worn debate concerning the avoidance of merger to prevent 'homonym clash' to see that homonyms can happily coexist in large numbers without significantly impairing communication.[12] Nevertheless, it is almost universally acknowledged that, all other things being equal, a sound change will be more effective in cases where no morphological information will be endangered.[13] More specifically, it has frequently been claimed that grammatical endings are more resistant to phonetic modification or loss than corresponding combinations which carry no such morphological function; several such remarks have been quoted in the preceding chapters, and similar statements abound in the literature of

Romance linguistics. It is, however, imperative that any such claims be substantiated, regardless of their intrinsic common-sense appeal, in order that the functional factors operative in sound change be rigorously accounted for in a comprehensive theory of diachronic linguistics. Kiparsky (1972: 224) succinctly summarizes the challange facing historical linguistics:

> The great difficulty with functional explanations in linguistics (and partly in other fields as well) has always been finding the general theories without which functional explanations of specific phenomena can have no empirical substance. It is easy to point at a specific historical event or synchronic fact and suggest an ad hoc "reason" for it. But however plausible such explanations may seem, they carry no force until backed up by general claims, which go beyond the case at hand, and which for that reason can be put to a test.

To date, no satisfactory method has been devised for providing a numerical characterization of 'functional load', although a number of quite detailed models have been proposed.[14] In other areas, however, particularly in the field of sociolinguistics, it has been possible to arrive at quantitative data which support in a striking fashion the claims that functional factors may take precedence over purely phonetic processes. Perhaps the most noteworthy of the recent studies touching on this topic is the work of William Labov on various dialects of Black American English and non-standard white American dialects.[15] The data collected by Labov indicate that, in long expanses of recorded conversation, the processes of reduction of word-final consonant groups (e.g. -ing to 'in, or the dropping of final t or d in past participles) occurs less frequently in cases where a grammatical category is signalled than when the identical combination serves no grammatical function. The number and variety of data adduced by Labov and his co-workers leave no doubt that functional factors do indeed provide a checking force against the otherwise powerful drive to weaken or simplify final consonantal clusters, thus providing the first vestiges of the empirical support called for by Kiparsky.

Additional support for the hypothesis that grammatical suffixes may survive otherwise regular sound changes may be observed in Spanish. In many dialects of Spanish, particularly in the Antilles and the coastal regions of Central and South America, syllable-final s is reduced to an aspiration [h], and sometimes dropped altogether. This process occurs both word-internally before consonants and word- (breath group-) finally, and it is perhaps in the Cuban and Puerto Rican dialects that this phenomenon reaches the greatest number of speakers, appearing frequently even in the most cultured conversations. However, by considering the interesting and highly illustrative data supplied by Ma and Herasimchuk (1968) and Fishman and Herasimchuk (1972) concerning the speech of Cuban and Puerto Rican speakers in the greater New York area, it can be quantitatively demonstrated that s is lost less frequently in word-final position when it signals the plural morpheme, or the second person singular of verbs, than in cases where no such morphological distinction is performed, typically word-internally but occasionally also in final position. Moreover, it was shown that final s of noun and adjective plurals was lost more often than the final s of second person singular verbs; a possible reason for this discrepancy will be discussed below. As an even more striking demonstration of the power of morphological function, the differential behavior of the definite articles may be noted. In Spanish, the masculine definite articles are *el* and *los*, while the corresponding feminine articles are *la* and *las*. Thus, only the final *s* serves to distinguish the singular and plural feminine articles, while the singular and plural masculine articles show a much greater phonetic difference. Not surprisingly, final *s* of *los* is lost more frequently than the final *s* of *las*; for example, the singular-plural distinction in such pairs as [el mučáčo]/[loh mučáčoh] is easily preserved even if the two final *s*'s are completely lost, while in a pair such as [la kása]/ [lah kásah] aspiration nearly obliterates the singular-plural distinction.

As a further corroboration of the Spanish data, Clegg (1967) conducted a spectrographic analysis of several speakers of Cuban Spanish, and found that, in cases where final *s* was completely deleted, the preceding vowel was slightly lowered, enough so that the morphophonemic distinctions could be preserved.[16]

Returning now to the main subject matter of this chapter, it has been repeatedly hypothesized that final vowels were preserved in such languages as Spanish, Portuguese and Italian in view of their morphological function of signalling grammatical number and gender. Moreover, the preservation of final vowels, particularly in Spanish and Portuguese, conserved the phonotactic generalization that no word-final consonant clusters may appear in 'native' words, since in words ending in a consonant, an epenthetic vowel is regularly inserted before adding the plural marker *s*. On the other hand, if one accepts this conclusion, it becomes difficult to explain such cases as French and Catalan, where the widespread fall of final vowels apparently obliterated much of this grammatical information. In Catalan, the almost universal loss of final atonic vowels led to a large number of final consonant clusters, in both singular and plural forms. In order to suggest some tentative reasons for this discrepancy, it will be necessary to briefly trace the processes of pluralization and gender marking in the languages under discussion.

4.5 Gender and number in Italian

In Italian, singular noun and adjective forms were taken from the Vulgar Latin accusative case, while the corresponding plural forms came from the nominative case. As a result, Italian signals plurality by an inflection of the final vowel, rather than by adding the desinence s. The most common pattern is the following: masculine singular: o, masculine plural: -i (e.g. libro-libri); feminine singular: -a, feminine plural: -e (e.g. casa-case). Nouns and adjectives ending in -e form the plural in -i whether masculine (professore-professori) or feminine (lezione-lezioni). Words ending in a stressed vowel (città), a consonant (sport), the combination -ie (serie)[17] and -i (crisi) remain unchanged in the plural. In addition, there are a number of apparent irregularities, generally stemming from Greek borrowings, or from a confusion involving the neuter gender in early Italian. For example, the Greek masculine nouns ending in -a (poeta, fonema, etc.) form their plurals in -i. The feminine noun (la) mano forms its plural as le mani.

In the cases cited above, although apparent irregularities do exist, the gender and number of any given form is uniquely determined, and may be further verified through the use of the unambiguous[18] articles, concord of adjectives and verbal concord, thus providing an extraction of morphological material through external means if necessary. There are, however, a number of common nouns whose bizarre singular and plural forms are the result of confusion with the reflexes of the Latin neuter gender (cf. *ŏvum-ŏva*). Such nouns form their singular in -*o* and their plural in -*a*. Grammatically, the singular forms are treated as masculine singular, while the plural forms are regarded as feminine plural: e.g. *il braccio*-*le braccia*, *il dito* - *le dita*, *l'uovo*-*le uova*, etc. A determination of the pecularities of these nouns requires prior knowledge of their unique behavior, and constitutes the only true point of indeterminacy in the process of number and gender marking in Italian. Thus it may be seen that, even in cases where inflection of the final vowel does not yield unambiguous results, the language provides further recourses for determination of gender and number. This is particularly significant in those regional dialects in which final vowels are reduced to schwa or deleted, for in these cases only such additional morphological signals will yield the required information.

4.6 *Gender and number in Spanish*

Compared with the situation in Italian, gender and number marking in Spanish is a relatively simple affair. In general, the masculine ending is -*o* and the feminine ending is -*a*; the respective plurals are formed by adding -*s*. Nouns or adjectives ending in a consonant or diphthong (always of the form *Vj*) form the plural by adding -*es*, except for words ending in an unstressed vowel plus *s*, which remain invariant in the plural (*el lunes*-*los lunes*). Nouns and adjectives ending in -*e* (and those relatively few ending in -*i* and -*u*) form the plural by adding -s; there is no inflection for gender. Nouns ending in a stressed vowel are required to form the plural by adding -es (dominó-dominoes) except for mamá, papá, sofá, and words ending in stressed e, which only add s. In most dialects, however, this is resolved in ordinary speech by merely adding s to all such forms.[19] Finally, there remain a few recalcitrant cases, mostly of Greek origin. There are a few feminine nouns ending in -o (mano, radio); these form their plurals by adding s and the plural forms remain grammatically feminine. In addition, there are several masculine words of Greek origin ending in -a (poema, morfema, [narrema?]); these also form the plural by adding s and remain grammatically masculine in the plural. Providing the final s is preserved, the articles in Spanish ensure unambiguous identification of any nominal form, together with such recourses as verbal and adjectival concord.

4.7 Gender and number in Portuguese

Gender and number marking in Portuguese is relatively complicated, although sharing several essential features with Spanish. No attempt will be made here to analyze the pluralization process;[20] the data will merely be presented. Portuguese shares with Spanish the basic patterns -o, -os for the masculine and -a, -as for the feminine; however, the o is reduced to [u] and the a to [ɐ] in most dialects, while the final s is normally [š]. Nouns or adjectives not exhibiting the o-a alternation do not generally inflect for gender, except for such irregular pairs as bom-boa, and certain adjectives of nationality or profession. It is in the realm of pluralization that the most complex developments ensue. All words ending in a vowel (except for the nasal diphthong -*ão*) form the plural merely by adding -*s*: *livro*-*livros*, *cama* - *camas*, *cidade*-*cidades*, *irmã*-*irmãs*, *pau*, *paus*. Forms ending in *r*, *z* and *s* (with accent on the final syllable) form the plural in -*es*: *favor*-*favores*, *rapaz*-*rapazes*, *português*-*portugueses*. Words ending in *s* with unstressed final syllable remain invariant in the plural: *o lapis*-*os lapis*. Words ending in -*em* or -*en* (phonetically [ẽ], [ẽJ] or [ɐ̃J], depending upon the dialect) also add -*s*, after orthographically changing the *m* to *n*: *homem*-*homens*. Words ending in -*al*, -*ol*, -*el*, or -*ul* drop the *l* and add -*is* in the plural: *animal*-*animais*, *farol*-*farois*, etc. Words ending in stressed -*il* drop the *l* and add *s*: *fuzil*-*fuzís*. Words ending in unstressed -*il* drop this ending and add -*eis*: *automóvil*-*autómoveis*. Finally, words ending in the nasal diphthong -*ão* [ɐ̃w̃] form their plural in one of three ways, depending upon the word in question: (1) By adding *s*: *cristão*-*cristãos*. (2) By dropping the diphthong and adding -*ães* [ɐ̃Jš]: *alemão*-*alemães*. (3) By dropping the diphthong and adding -*ões* [õJś]: *lição*-*lições*. As in Spanish, there are a few cases where the apparent surface markings for gender are violated (e.g. *a mão*-*as mãos*, *o poema*, etc.); in all such cases, the use of articles and gender concord disambiguates any construction in which such words are found.

4.8 *Gender and number in Catalan*

Marking for gender and number in Catalan appears, on first inspection, to be highly unusual, but in several major aspects the situation is not radically different from that of Spanish. As noted above, Catalan preserved only final *a* with any regularity. However, the vestiges of Latin -*us*, coming from the accusative masculine singular ending, often remained as -*e* [ə], especially after *muta cum liquida* groups.

All forms not falling into one of the special categories to be enumerated below form the feminine merely by adding *a*, although the phonetic distinction is obliterated in most dialects by the reduction of atonic *a* to [ə]: *altre*-*altra*, *ample*-*ampla*, *mateix*-*mateixa*, *verinós*-*verinosa*, *content*-*contenta*, *blanc*-*blanca*, etc. Quite frequently, the final consonant is voiced (*agut*-*aguda*, *amic*-*amica*) in the feminine; this occurs in words ending in *t* or *c*, coming from Latin -*tu* and -*cu*, respectively. Words ending in *s*, from Latin -*ssu*, -*cyu*, or -*rsu* double the *s* (orthographically) before adding the *a*, thus preserving the voiceless pronunciation: *gros*-*grossa*, *escàs*-*escassa*. Words ending in a stressed vowel, originally containing a final *n* in Vulgar Latin or Ibero Romance, form the feminine in -*na*: *humà*-*humana*, *ple*-*plena*, *diví*-*divina*, etc. Words ending in the glide [w] change this glide to *v* before adding *a*: *nou*-*nouva*, *meu*-*meva*. There are also some more irregular feminine forms, such as *roig*-*roja*, *mig*-*mitja*, where, however, the irregularities are often orthographic. Finally, as in the other languages under discussion, there are a few adjectives coming from the Latin third declension which show no inflection for gender: *alegre*, *feel*, *gran*, *pairal*, *veïnal*, etc. Originally, Catalan provided a set of definite articles embodying distinctions of grammatical gender; however, in most major dialects, these have been replaced by the pair *el*-*els*, providing only for the singular-plural distinction. Therefore, in many cases, gender concord is destroyed in Catalan, both through the loss of final vowels and through the reduction of unstressed *a* and *e*; however, as has been noted, many adjectives (ending in consonants) still allow this distinction to be realized in speech, much as in modern French.

The plural of a noun or adjective in Catalan is formed by merely adding an s to the corresponding singular form.

4.9 Information theory and redundancy

In the preceding four sections, the processes of gender and number marking have been explored for the four languages forming the basis for the present discussion. Careful analysis indicates that, regardless of the grammatical potential of the final vowels, each of the languages permits a certain amount of redundancy and indeterminacy with respect to these two grammatical processes. Italian makes the fullest use of final vowels, utilizing them not only to mark gender, but to mark number as well. In Spanish, Portuguese, and Catalan, there is a relatively greater number of cases of ambiguous gender, considering only the forms taken in isolation. Noun and adjective pluralization is generally unambiguous in all four languages, especially given the additional recourse of verbal and adjectival concord. In addition, the widespread loss of final atonic vowels in Catalan has resulted in a phonotactic pattern significantly different from those of the other three languages, yielding an expanded number of final consonants and consonant clusters. Thus, it may be conjectured that, while morphological factors may perhaps have prevented the wholescale loss of final unstressed vowels,these factors are by no means of an absolute nature; moreover, even in cases where final vowels remain, considerable ambiguity often results. It appears, therefore, that the relative role of morphological function in determining rate of loss of final vowels often gives way to purely phonetic processes of weakening, to a differing extent depending upon the language in question. Given the current state of knowledge of diachronic processes in general, and also given the necessarily limited scope of the present discussion, it is impossible to offer a comprehensive theoretical statement concerning the relative weighting of final apocope and retention based on morphological function. It is possible, nevertheless, to suggest a highly plausible area in which the directions for an eventual solution may be found.

Information theory is in essence a formalized study of the communicative capabilities of natural languages. As such, the basic concepts of information theory may be profitably extended to both the synchronic and the diachronic study of language, a fact which has been noted at least since the time of Zipf (1935).[21] Speaking in general terms, one may define the information content of a message, from the standpoint of the receiver (where 'information' is the primitive, undefined term) as that quantity of data which is new to the receiver of the message, that is, that provides him with a hitherto unknown access to material. The information content of any given message is largely determined by the receiver himself, and also by the pragmatics of the communication act; for example, the message 'This building is on fire' would carry high information content if shouted outside one's window at 3:00 in the morning; the same message would carry virtually no information if uttered to a person standing outside observing the fire. Similarly, the same message, shouted in English, would carry no information content for a person with no knowledge of the language, regardless of additional circumstances. This definition of information content, while highly rudimentary and analogical, is nonetheless sufficient to visualize the action of such grammatical processes as concord. The opposite of information is redundancy; a message is redundant to the extent that it supplies data already known to the receiver. The concepts of information and redundancy are intimately connected with the general diachronic behavior of information-carrying sequences (i.e. morphemes).

Starting first with the concept of gender concord, it is obvious to any speaker of English that grammatical gender is irrelevant; many languages happily survive with absolutely no vestiges of grammatical gender marking. In those languages which do employ such markings, the gender morphemes serve the function of check morphemes, that is, morphemes periodically inserted in the message to ensure that the message is being correctly processed. Check morphemes play an essential role in formal messages; for example in computer programs or automatic data transmission systems, by providing a constant verification throughout the expanse of the message that errors of transmission or reception are not being propagated. As a simple but illustrative example, consider a code language in which messages are transmitted in bursts of five digits, each of which is either 0 or 1; i.e., a binary code. Let the first four digits of each burst be the information-carrying morphemes, and define the last digit as 0 if the sum of the preceding four digits is even and as 1 if the sum of the preceding four digits is odd. The final digit of each burst, then, serves as a (parity) check that the information-carrying part of the sequence has been correctly received; a discrepancy will be noted if an odd number of errors has been propagated. Such check morphemes can obviously be incorporated into systems of any degree of sophistication and complexity, and the probability of error can be reduced to an arbitrarily small quantity; a much more complex but basically identical system is built into the book numbering code of the Library of Congress.

Returning to the subject of natural languages, it is easy to see that gender concord provides a system of check morphemes, indicating that the correct grammatical relations between the various constituents have been perceived. A language which makes use of such markings is, all other things being equal, more redundant than a language which does not. A certain amount of redundancy is essential to the efficient functioning of any natural language, and the lack of gender marking in a language is generally compensated for by additional systems of check morphemes.[22]

Maintaining the singular-plural distinction is usually regarded as a relatively important semantic distinction, and consequently many, but not all, languages overtly mark number in some fashion. The Romance languages are no exception. What is unnecessary, however, is the marking of grammatical number in more than one place in any given sentence, as any student of English will recognize. Thus, in those languages where number concord operates both over adjectives and verbs, these additional inflections may be regarded as check morphemes, serving to ensure that the proper relations have been processed. As noted above with regard to Spanish, loss of word-final s results in no loss of information when, for example, verbal concord remains operative. Similarly, in those Italian dialects in which most or all final vowels have been reduced or deleted, verbal concord, together with the articles, demonstratives, and similar check morphemes facilitate recovering semantic information regarding number and sometimes gender. In this sense, then, it may be affirmed that in any language in which verbal and adjectival concord is operative, and which in addition provides check morphemes such as differentiated articles, overt number markings on nouns and adjectives may be, and quite often are, redundant from an information-theoretic point of view.

These same general considerations also account for the behavior of the verb-final morphemes signalling such grammatical categories as person and number. In the four languages under discussion, the highly differentiated verbal forms have permitted the optional deletion of the (redundant) subject pronouns. As a consequence, this minimal redundancy virtually precludes the obliteration of the phonological distinctions embodied in the verbal endings, and sheds light on the observation that final s in Spanish resists aspiration more strongly when signalling the second person singular morpheme (-s in all tenses except the preterite) than when forming part of the first person plural morpheme (-mos), the nominal plural marker, or other similar cases where additional check morphemes generally preserve the necessary morphological information. It may also be noted that, in Spanish dialects where aspiration of syllable-final s is widespread, the use of the subject pronouns tú and usted is much more frequent, thus facilitating the unconditional aspiration of all instances of word-final s. In languages such as French and English, where differentiation of verbal forms, as well as (audible) verbal and adjectival concord, are minimal, retention of subject pronouns is generally obligatory.

Sankoff and Cedergren (1971) present a set of data concerning the deletion of l in the French of Montreal. It was found, for example, that l was deleted 97.9% of the time in the pronoun il when it served as impersonal subject (il faut), but only 92% of the time when il referred to a masculine singular individual (il m'a dit). Similarly, the pronoun les exhibited an l-deletion rate of 46.8%, while the plural article les exhibited an l-deletion rate of only

18.7%. Speaking of the former case, the authors note (p. 67):

> This difference in deletion rates cannot be explained in terms of phonological environments. It must be due to the different syntactic function of the two forms or the quantity of information transmitted--so that the personal _il_, whose main function is to replace a noun, and which contains more information than the impersonal _il_, is less susceptible to /l/-deletion.

The latter case is explained as follows (pp. 68-9):

> We can interpret the low deletion rates for the article _les_ in terms of the information about number it transmits. This information is carried by the noun only in certain irregular cases--for example: _cheval_-_chevaux_. Usually it is carried only by the article:
>
> _le_ _garçon_-_les_ _garçons_
> _la_ _table_-_les_ _tables_
>
> Given the importance of the article _les_ in transmitting information about the number of the noun, the /l/ is less susceptible to deletion ... Of course, the pronoun _les_ also carries information about number; however, in order that the referent of the pronoun not be ambiguous, it must appear ... relatively close to the pronoun in the utterance. The information 'plural' is thus already present in the context and the plural pronoun loses its importance.

Bearing the above facts in mind, it now becomes clear why final vowels were often reduced or deleted among the Romance languages, even when grammatical signals were thereby obliterated; the systems of check morphemes built into the various concord mechanisms in most cases more than compensate for the loss of morphological information occasioned by loss of final vowels. Considering only markings of gender and number, it is apparent that Italian exhibits the highest degree of redundancy, of the four languages under discussion, followed by Spanish, Portuguese, and Catalan, in that order. This fact now permits a more general statement concerning the behavior of final vowels in these languages.

From a phonetic point of view, final atonic vowels occupy a very weak position; therefore, it may be concluded with a reasonable degree of certainty that it was the grammatical function of these vowels which prevented their more general loss in the Romance languages being considered. For example, Catalan is the only one of the four languages in which the reflex of the Latin termination -u, characterizing the masculine singular, was lost with great regularity. In Spanish and Portuguese, only final e, which does not serve to distinguish gender, was lost, while in (standard) Italian, no final vowels fell. The relative behavior of final atonic vowels in the four languages heretofore considered, therefore, seems to be a direct function of the overall rate of loss of unstressed vowels in other positions: in Italian, where unstressed vowels exhibit the lowest rate of loss, final vowels fared the best; to the latter observation must also be added the dual morphological function performed by final vowels in Italian. Portuguese, exhibiting a slightly higher rate of atonic syncopation, deleted a correspondingly greater number of final vowels; in many modern dialects of Portuguese, an increasingly strong stress accent is dropping or severely reducing the remaining word-final vowels. Spanish, in which rate of loss due to syncope is higher than in the preceding two cases, shows even greater numbers of cases of loss of final vowels. Finally, turning to Catalan, in which by far the greatest number of vowels fell through syncope, virtually all vowels, with the exception of the phonologically most resistant a, fell in final position. By viewing the process of gender and number concord in the light of communication theory, the behavior of final atonic vowels among the Romance languages loses some of its mysterious appearance, and a clearer insight is provided into the interaction of forces of positional strength and the drive to preserve morphological material.

4.10 Conclusions

The remarks in 4.9 must, in view of their rudimentary and non-rigorous nature, be regarded as only suggestive. They do, however, correlate rather well with the other observations which have been offered concerning the behavior of atonic vowels in the early Romance languages. Each of the four languages under discussion suffered a certain degree of loss of unstressed vowels, and the rate of loss is different in each case. The statistical data presented in the foregoing chapters are not sufficient to offer a numerical function characterizing the exact rate of loss in the four languages; indeed, it may never be possible to precisely formulate such a function. Whatever the cause for differentiation, the loss of unstressed vowels operated, to a greater or lesser extent, in each of the four languages, being checked in non-final position primarily by considerations of phonotactic compatibility. In final position, morphological considerations appear to have triumphed in most instances, except in Catalan, where the greatly increased rate of loss was sufficient to result in the deletion of a large number of final vowels. Thus, any theory incorporating the notion of diachronic strength hierarchies will have to incorporate the additional limiting conditions of phonotactic compatibility and functional load. Only by precisely determining all three of these factors will it be possible to offer numerical characterizations of the diachronic behavior of the languages being studied.

Notes to Chapter Four

1 Cf. Grandgent (1927: 47-8).

2 In various Continental dialects, a fleeting paragogic *-e* may be heard in words ending in *-l* and *-r*. Cf. Saco Arce (1868: 20-21), Soares de Azevêdo (1903: 122), Williams (1962: 47, 112), and Leite de Vasconcellos (1970: *passim*).

3 Cf., among others, the following sources: Gonçalves Vianna (1887), Leite de Vasconcellos (1890a, 1890b, 1896a, 1896b, 1899), dos Santos (1898), Dalgado (1900, 1906), Nunes (1902), Fortes (1944), Rogers (1946, 1948, 1949), Strevens (1954), Batalha (1958), Thompson (1959), Herculano de Carvalho (1962b).

4 Cf. the various observations offered by Houaiss (1958).

5 The data concerning Catalan have primarily been gathered from the following sources, in addition to a number of minor journal articles: Mila y Fontanals (1876), Brekke (1888), Fabra (1906), Schädel (1908), Griera (1913, 1931), Pereira (1915), Rosketh (1921), Fouché (1925), Meyer-Lübke (1925), Badía Margarit (1951, 1962), Moll (1952), Alarcos Llorach (1960), García de Diego (1961), Russell-Gobbett (1965), Lleó (1970).

6 In the early Catalan period, that is. Syncope of the posttonic penult during the Vulgar Latin period did not prevent final apocope; e.g. *ocŭlu* > *oclu* > *ull*.

7 For a more complete treatment, the reader is referred in particular to Moll (1952: 93-6).

8 The unique exception to this accentual pattern is the posited development *pellicicare > pecigar.

9 Cf. Moll (1952: 98-101) for details.

10 An excellent example of this development within the framework of generative phonology is provided by the work of Kiparsky. In his dissertation (1965), Kiparsky went to great lengths to refute many of the working principles of structural linguistics; in his latest work (1971, 1972), he speaks of 'functional considerations', 'paradigm conditions', 'minimization of allomorphy', etc., in a manner highly reminiscent of the work of Martinet (1955) and other structural linguists.

11 For more detailed discussion of particular cases, see Malkiel (1960, 1962, 1963-64, 1966, 1968, 1969, 1970), Rochet (1970, MS).

12 In particular, it is the use of the term 'tendency' by structural linguists which has come under severe attack by generative grammarians. Thus King (1969b: 193) remarks: 'Any claim containing the statistical qualifier "tend" is usually so weak as to be valueless'. Kiparsky (1972: 195-6) is even more categorical:

> One of the reasons why functionalism has generally failed to get off the ground is that it has been content with making vague statements to the effect that there exist certain "tendencies". It is necessary to give a precise interpretation to this claim before anything can be done with it. I would like to propose that a tendency for some condition A to be implemented is for a language meeting condition A to be more highly valued, other things being equal, than a language not meeting condition A.

Generative grammar, however, has also developed a number of theoretical concepts, such as the evaluation metric, global derivational constraints, and markedness conditions which, while perhaps possessing empirical content, remain to be definitively established. Thus, when the dust settles over the terminological debate concerning 'tendencies', it can be seen that the basic methodology of functional-structural linguistics and generative grammar are rapidly converging, especially when it is necessary to offer generalizations based on a large corpus of data.

13 Cf. Kiparsky's (1971: 602) proposed hypothesis that 'morphological material which is predictable on the surface tends to be more susceptible to loss than morphological material which is not predictable on the surface'. Note also the use of the word 'tends' in this paper, which postdates the 1972 paper, presented in 1969.

14 One model, and a good survey of the literature, is provided by Meyerstein (1970).

15 The results in question were first reported in Labov *et*. *al*. (1968), and have also appeared, in different versions, in Labov (1969, 1970, 1971, 1972, 1973).

16 For Cuban Spanish, cf. Isbaşescu (1968). This same tendency has also been noted, although not experimentally verified, for other Spanish dialects.

17 With the (orthographic) exception *la moglie*, whose plural is *le mogli*. Here the *i* of *moglie* serves as part of the combination *gli*, representing the lateral liquid [λ].

18 Unambiguous, that is, except in the case of the elided article *l'* which appears before words beginning in a vowel.

19 This confusion occasionally results in multiple variants of a single form in the plural. For example, in Cuban and Puerto Rican Spanish, the noun *maní* 'peanut' variously becomes, in the plural, *manís*, *maníes*, and *manises*; the back-formation *manís* in the singular has also been observed.

20 In addition to traditional accounts, found in any Portuguese grammar, see Agard (1967), Hensey (1968), Saciuk (1970), Brasington (1971), St. Clair (1971), and Lipski (1973).

21 The following remarks have been largely stimulated by the work of Beckmann (1972). A number of other considerations are provided by Cherry (1966).

22 Cf. the general discussion in Beckmann (1972). Information theory in general treats language only as an information-carrying code, and consequently makes no provisions for the impact of any message on the receiver (cf. Frumkina 1963, Paducheva 1963). However, in order to apply the theory of communication to natural languages regarded as error-detecting codes (as done, for example, by Beckmann), it is necessary to consider the information content of a message from the standpoint of pragmatics; i.e. the effects of a given message on the receiver. Beckmann's book provides an excellent discussion of these concepts, together with a number of useful illustrations. For remarks on a different model, see Afendras (1970, 1973), Afendras and Tzannes (1969, 1971), Afendras *et*. *al*. (1971, 1973). Some remarks concerning final grammatical endings in German are found in Chisholm (1973).

CHAPTER FIVE
A MORPHOLOGICAL CHANGE IN ITALIAN

5.1 Introduction

In Chapter Three it was seen that, from the standpoint of syncopation and weakening of vowels, occurring in the early history of a set of the Romance languages in their evolution from Vulgar Latin, it is possible to establish a tentative strength hierarchy based upon position within the word, as well as a more general and somewhat less clearly defined hierarchy of intrinsic vocalic strength. Data from the other end of the diachronic axis, representing modern Italian and Spanish, were adduced to hint at the possible bases for such hierarchies, and to suggest that essentially the same hierarchical structures may characterize the modern languages as well. In this chapter data will be considered from an intermediate point on the diachronic scale, involving developments occurring in the early periods of literary Tuscan. The data to be considered center around a complex set of diachronic developments which may be most easily characterized in terms of the hierarchical arrangements isolated in the preceding chapters. To the extent to which this demonstration may be considered to be at least partially successful, support will be lent to the hypothesis that the phonotactic development of Italian, and by inference, of other Romance languages, has been constantly affected and guided by the existence of certain well-defined hierarchies. This in turn will lend empirical support to the methodological practice, widespread but seldom explicitly justified, of assuming an invariant structure for any given language across a chosen time-base, in the absence of evidence to the contrary. Moreover, by demonstrating the sustained action of strength hierarchies in the diachronic evolution of Italian, it should ultimately be possible to coherently extend the theoretical concept of phonological hierarchies to the characterization of developments in the other Romance languages, and eventually to other language families as well.

5.2 The problem

Every known language exhibits phonological and morphological alternations. Some alternations stand as clear reflections of general phonotactic processes; for example, homorganic assimilation of nasals to a following obstruent. Other alternations, while synchronically rather anomalous, represent the results of previously occurring phonological processes; for instance, the loss of stem-final *l* and *n* during pluralization in Portuguese, which is the result of an earlier change deleting intervocalic *l* and *n*. Still other alternations appear to be purely morphological in nature, and while serving as part of the automatic language competence of speakers, reveal no apparent phonetic or phonological basis. One apparent example of the latter type of alternation is offered by the formation of the future and conditional tenses of Italian verbs of the first conjugation. In these tenses, the thematic vowel, normally *a*, becomes automatically shifted to *e*, while all other forms either preserve the stem-final *a*, or replace it with a morphological suffix; thus, for example, from *parlare*, the following forms are derived:

future	conditional
parlerò	parlerei
parlerai	parleresti
parlerà	parlerebbe

parleremo	parleremmo
parlerete	parlereste
parleranno	parlerebbero

In the remaining two Italian conjugations, ending in *ere* and *ire*, the thematic vowel does not become altered in the future and conditional, although it sometimes disappears due to earlier syncope. We have, for example, from *ripetere* the forms *ripeterò*, *ripeteresti*, etc.; from *capire* such forms as *capiranno*, *capirebbero*, and so forth, all with the thematic vowel unchanged. Alternations of this sort have traditionally been noted by Italian grammarians and philologists, but no systematic attempt at accounting for them has ever been offered, although a number of partial suggestions are scattered throughout the literature. In this chapter an effort is made to trace the possible origin and development of this series of vocalic alternations. The tentative results which may be established on the basis of such investigation seem to bear directly on the problem of diachronic phonological strength hierarchies. In order to visualize the conclusions, however, it is first necessary to remove several obstacles in order to obtain a clear view of the primary data from which theoretical speculations may be extracted.

5.3 *The origin of the change*

As a preliminary observation, it should be pointed out that the shift of *a* to *e* in the future and conditional apparently had its origin in the Tuscan dialect spoken in and around Florence;[1] even today there are many local Italian dialects in which this change was not effected, and in fact some in which the opposite change of *e* to *a* occurred. The date of this shift within the Tuscan dialect is nearly impossible to determine with certainty, since it appears to have coincided with, or even preceded, the transition from Latin to Italian as the literary standard. Migliorini (1963: 140) gives an example of one of the earliest attestations of the vocalic alternation in a document dating from about 1250, in which the form *manderò* (from *mandare*) is found alongside remnants of the Latin synthetic future, such as *dirabo* (from *dire*). In the works of Jacopone da Todi (ca. 1236-1306), we encounter variant forms of the verb *avere*, including *averai* and *averà*, and also *arò*, indicating the early syncope of the pretonic vowel.[2] Other Tuscan writers of the same period show evidence of the shift of *a* to *e* in their works. For example in *Il Libro dei Vizi e delle Virtudi* (1272) by the Florentine Bono Gamboni, the change is already in progress; in Chapter Six we find *porterete* (from *portare*) and *lamenterete* (from *lamentare*). In Chapter Eight there appear *durerà* from *durare*, in Chapter Eleven *consiglierò*, from *consigliare*, and so forth, alongside numerous forms in which the thematic vowel *a* has remained unaltered in the future and conditional.

In the *Istoria Fiorentina* of Riccordano Malispini, dating from approximately the same period, the forms *tornerebbono* (from *tornare*; note the archaic conditional form) and *manderò* (from *mandare*) are found. In Ristoro d'Arezzo's *La Composizione del Mondo* (1282), forms in *a* are found almost exclusively; this may be in part due to the fact that the author was not from Florence, but from Arezzo, a short distance to the south.

A century later, the change of *a* to *e* had become firmly implanted in Dante's *Divina Commedia*, where, however, one example of the change in progress is provided by an unsyncopated future form of *andare* in the *Paradiso* (Canto 30, line 144): *Non anderà con lui per un cammino*. Here the *a* has been raised to *e* but not yet syncopated. That some variation still existed during this period is also suggested by the appearance of the older forms in *a* in the work of some of Dante's contemporaries. For example, in Boccaccio's *Decameron*, we find (Giornata seconda, novella decima) the line: *Tosto ella mi si gittarà incontenente al collo*; only a few lines later, however, we encounter such phrases as *voi mi perdonerete*, *qual donna canterà*, etc. In the *Rime* of Petrarch we also encounter (no. 28, line 36) the line: *Con Aragon lassarà vota Espagna*.

In the first known Italian grammar book, the *Grammatichetta Vaticana* of Alberti, written towards the end of the 15th century, the change of *a* to *e* in the first conjugation future and conditional forms is listed.[3] Bembo's *Prose della Volgar Lingua* of 1512 also states this alternation, although indicating that there are many people even in Florence who still pronounce the *a*.[4] Later Italian grammars, such as those of William Thomas (1550), Henry Granthan (1575) and Giovanni Florio (1591) unanimously record the raising of *a* to *e* in verbal forms and in some nouns.[5] By the 1600's, the Tuscan standard had become the norm for all of cultured Italy; while one still finds forms with the *a* unaltered in the writings of non-Tuscan authors, such a practice was stigmatized by the grammarians.[6]

Once the change had been at least initially implemented in Tuscany, it spread gradually to some of the other Italian dialects. As early as 1374, we find traces of Tuscan influence in the *Rime* of the northern Italian poet Antonio Beccari; for example in the poem "Primo che 'l ferro" one finds (line 18): *el non ve mancherà finir questa opra*, while a short time later (line 44), the 'normal' northern pattern reappears in the conditional form bastarebbe.[7]

By the 14th century, the Tuscan innovations were beginning to leave their trace on manuscripts written in the Roman dialect; however, Ernst (1970: 59) feels that the appearance of e for a in the future and conditional stem of first conjugation verbs is largely due to the analogical influence of the verbs in -ere, which, as noted above, retain the thematic vowel e throughout the paradigm. Since Ernst's study was based solely on an examination of documents, one must of course add to his theory of analogy the most likely source of influence, namely the writings of the Tuscan literary figures such as Dante, Boccaccio, and Petrarch.

Returning now to the Tuscan dialect, where according to all available evidence the vocalic alternations originated, one must address the question of precisely why the change occurred in the first place. The attempted answers to this question have been many, although all clustering around a few common opinions. Before examining the assortment of scholarly opinions, however, one salient point should be brought forward: the shift of the thematic vowel from a to e in the future and conditional affected all verbs of the first conjugation except dare, stare, fare, and andare. In the former three verbs, the thematic vowel remains unaltered in the future and conditional; in the case of andare, the thematic vowel is syncopated, although originally the theme vowel a was changed to e as noted in the above citation from Dante. In addition, the future and conditional forms of essere exhibit the stem sar-, presumably by analogy with the forms of stare. These exceptions must be kept in mind when evaluating the opinions of the various investigators who have considered the problem.

5.4 *The raising influence of* [r]

By far the great majority of authors discussing the events in question have ascribed the shift of *a* to *e* in the future and conditional to the 'raising influence' of the following *r*, which occurs in all future and conditional forms. Such an observation logically follows from the fact that each of the verbs under discussion exhibits the alternation *ar*-*er*, with *r* being the common factor uniting the variants. Some scholars have been content to merely categorize the before and after effects of the change in a purely descriptive fashion. Thus d'Ovidio and Meyer-Lübke (1904: 671) remark in passing: 'Vor *r* wird *a* ... zu *e* bleibt'. Rohlfs (1949: 230) states: 'Was *a* betrifft, so wird dies vor *r* im Florentinischen in der Regel zu *e*'. More prevalent, however, has been the view that the presence of the following *r* in some way *required* the shift of *a* to *e*. Meyer-Lübke (1890a: 290) stated: 'Von den Sonanten is *r* der wichtigste ... vor sich bedingt es *e* im Italienische'. Guarnerio (1918: 354) remarked that 'Nell'italiano il R vuole davanti a sè un *e*'. Elsewhere (p. 321) he amplified this remark: 'Così il *r* preferisce essere preceduto da *e* atona, il *l* da *o*, il *m* *n* e altre consonanti da *a*, purchè la vocale atona non sussegua ad una palatale, e la finale sia *a* od *o*'. Bourciez (1967: 485) noted: 'En effet l'*a* lui aussi éprouve devant *r* une fermature en *e*, soit à la pénultième ... soit devant l'accent'. The same position was also taken by Lausberg (1956: 155): 'Wo der Mittelvokal erhalten bleibt, kann er durch die umgebenden Laute verschieden beeinflüsst werden. So verlangt das It. vor *r* die Qualität *e*'. A similar conclusion is echoed by Battaglia (1970: 169):

> La formazione moderna del futuro è perciò assai semplice e chiara ... Il cambiamento, per la prima coniugazione, di *a* del tema dell'infinito in *e* si deve alla presenza di *r*.

Bec (1970: 152) is of the opinion that 'il s'agit d'un changement conditionnée en position de *a* devant *r*'. A somewhat more moderate position was suggested by Grandgent (1927: 55-6):

> The choice of *e* when *r* follows and *i* elsewhere is probably a phenomenon of association, *e* being in the whole mass of words the commonest intertonic vowel before *r*, *i* the commonest before other consonants. The Sienese preference for *a* may show the assimilative power of the first conjugation, or simply the natural tendency of *r* to open a preceding vowel.

These remarks are, of course, largely circular, since the reason for the predominance of *e* before *r* is precisely the fact that *a* was often changed to *e* in this position, and reflects no overriding Latin phonotactic heritage. Scepticism has also been evinced by Pei (1941), who notes the following in connection with the vocalic alternations in the verb stems:

> In the first conjugation it is to be noted that this restored or retained vowel is *e* where we should expect *a* ... a general rule that pretonic *a* tends to become *e* before *r* has been suggested. Before other consonants the change seems to be in the direction of *i*: (*collocare* > ... > *corricare*), *oboedire* > *ubbidire*). (p. 39)

> The e for a in the first conjugation infinitive ... is somewhat doubtfully accounted for by the fact that it is followed by r; an alternative explanation is that amerò is analogically influenced by persuaderò, perderò, and so forth; this is equally doubtful since there are more verbs of the first conjugation than of the second and third conjugations combined. (p. 103)

Mendeloff (1970: 14) mentions the alternation without offering any opinion other than that there was a 'tendency' for the vowel e to appear before r.

To the above observations must also be added the fact that in the third conjugation, the thematic vowel is i, which finds no analogue in verbs of the other conjugations. Nor have the verbs of the third conjugation ever shown any inclination to fall under the influence of the dominant future-conditional er pattern represented initially by the second conjugation verbs and later joined by the verbs of the first conjugation.

5.5 The lowering influence of [r]

All the above studies, and others like them which may be sifted from the literature, have inclined toward ascribing to the consonant r the potential ability to raise preceding vowels. There exists, however, a far from negligible number of linguists who feel that, to the contrary, the dominant characteristic of r is the tendency to lower contiguous vowels. Grandgent's speculations with respect to the lowering of e in southern Italian dialects have already been noted. An even more programmatic assertion was offered by Deferrari (1954: 29):

> A vowel is sometimes opened when it is adjacent to a variety of r. This opening effect of r is strongest (most frequent) when the r follows the vowel and, at the same time, is followed by another consonant. The opening effect of r is less strong (less frequent) when the r follows the vowel and is, in turn, followed by another vowel. The opening effect of r is weakest when it precedes a vowel.

Needless to say, several of Deferrari's conclusions stand in marked contradiction with the observable developments in Italian, a fact which Deferrari himself was often hard pressed to defend. For example, in considering the change of sarmento to sermento, which would be highly unlikely given his posited hierarchy, Deferrari (p. 152) alludes to the possibility of analogy with certain forms in which the opposite development ensued, such as starnuta < sternuta. More baffling, however, is Deferrari's attempt at accounting for the shift of a to e in the future and conditional of first conjugation verbs, for, in referring to the development of cantarà to canterà he states (p. 164):

> The above-indicated development is consistent with our generalities for the opening effect of r ... since [i] is the most frequent result of V. L. [initial syllable pretonic] vowels which were kept as vowels in Italian ... the [e] of the above rule is very probably the result of the opening effect of r.

The only way to make sense out of this rather confusing passage is to infer that the thematic vowels in question were first raised to i, by whatever means, and subsequently lowered to e by the effects of the following r. Such a pattern of events of course remains purely hypothetical, and is in fact contradicted by the abundant documentation, which fails to reveal any such tendency. In addition, one is left puzzled by Deferrari's reference to the initial pretonic syllable, since the thematic vowel of the future and conditional, while pretonic, is certainly not in the initial syllable, except in the future and conditional forms of *dare*, *fare*, and *stare*, in which case it remains as *a*!

The lowering power of *r* has also been postulated, in another context, by Otero (1971: 60), in speaking of a cited form *sarao* from the Galician-Portuguese *serão*. He notes that the former results from the latter 'con la *e* abierta por la *r* contigua, como en el Fr. *marché* "mercado"'. Gili i Gaya (1932: 245), in considering some similar data from Catalan, also speaks of 'la tendència general del català a obrir les vocals travades per *r* o *r̄*'. This proposed power to lower vowels has recently been nominated for language-universal status by Vennemann (1972: 883). Vennemann considers various developments apparently influenced by the presence of the alveolar trilled *r*, including data from Spanish and various Germanic languages, and concludes that *r* exhibits a definite propensity to lower vowels, although not without exceptions.

5.6 *Further remarks on* [r]

Seing the field of inquiry thus divided, between those who feel that *r* tends to raise vowels and those who maintain that vowels are lowered in the vicinity of *r*, not to mention those who ascribe no special status whatsoever to *r*, one is left with a feeling of confusion as regards the effects of *r* in the Italian case under discussion.

Each claim as to the possible phonetic effects produced by r has been accompanied by at least some concrete examples adduced as evidence. On the basis of these conflicting results, several tentative conclusions emerge: first, that any particular effects to be attributed to r are language- and even situation-specific; second, that in evaluating the data, errors have been made regarding the possibility of an r either raising or lowering a vowel; third, that r exerts no influence at all on neighboring vowels, and that all reports to the contrary are erroneous. The third possibility seems to be in general refuted, owing to the large number of observations which have been reported in various languages; it is still possible, although quite unlikely, in the particular Italian case under consideration. In no other phonetic environment in Italian did a become e, or vice versa, with any regularity; hence, the conclusion implicating the r in the change. As regards the actual direction of any change motivated by r, one must delve into the phonetic and phonological features represented by the segments under consideration. Perhaps the most useful way of visualizing the relationships between a, e, and r is to display these segments as simultaneous bundles of features, thereby manifesting any obvious traits the segments may have in common. Starting first with the vowels a and e, there is not a great deal of possible variation in the description of these segments, regardless of the descriptive framework chosen. In the Jakobsonian binary framework, the two vowels stand in the following relationship:[8]

$$\begin{bmatrix}-\text{dif}\\+\text{cmp}\\+\text{grv}\end{bmatrix}\quad /a/ \qquad\qquad \begin{bmatrix}-\text{dif}\\-\text{cmp}\\-\text{grv}\end{bmatrix}\quad /e/$$

Here the shift of a to e may be interpreted as a simultaneous raising and fronting, which is more clearly depicted by the articulatory features of Chomsky and Halle (1968):

$$\begin{bmatrix}\text{+back}\\ \text{+low}\\ \text{-round}\end{bmatrix} \quad /a/ \qquad\qquad \begin{bmatrix}\text{-back}\\ \text{-low}\\ \text{-high}\end{bmatrix} \quad /e/$$

As might be suspected, the problem lies in the specification of /r/. In the Jakobsonian distinctive feature framework /r/ has generally been represented as:[9]

$$\begin{bmatrix}\text{+voc}\\ \text{-cons}\\ \text{-comp}\\ \text{+diff}\\ \text{-grv}\\ \text{-cont}\end{bmatrix}$$

Upon seeing such a display, one might be tempted to regard the change of *a* to *e* before *r* as an assimilation of the values of gravity and compactness. It must be remembered, however, that the features *grave*, *compact*, and *diffuse* refer to different parameters depending upon whether one is discussing vowels or consonants; consequently, the apparently similar specifications of /e/ and /r/ lose much of their plausibility; note that the value of diffuseness is not assimilated. Intervocalic [r] in Italian is a single voiced alveolar flap, much like that occurring in American English *ladder*. It has no overt similarity with either [a] or [e], other than sharing such general features as voicing, and therefore a measure of doubt is cast on the practice of classifying this sound as [+vocalic].

Within a more modern distinctive feature framework, Harris (1969: 46) has attempted to describe *r* as follows:

> The segment [r] is simply a voiced apicoalveolar single flap. We may confidently assign to it at least the features

> [+vocalic, -consonantal, -obstruent, +voice, +anterior, +coronal, -strident], and with only slightly less confidence, [+continuant, -tense].

Chomsky and Halle (1968: 177) adopt a similar specification for r, except that, unlike Harris, they specify r as [-anterior]. Andersen (1968: 175) feels, however, that r is characterized by the specification [- continuant]. Vennemann (1972: 886) who, as noted earlier, considers r to exert a lowering influence upon neighboring segments, suggests that r be represented as [+low], at least in certain environments.

It is obvious that discussion of the specification of r could be prolongued indefinitely; equally obvious, it seems, is the fact that the presently available distinctive features tell us little about any possible assimilatory effects r might exert on contiguous vowels. In order to determine the latter, it is necessary to consider the articulatory details of the Italian single intervocalic [r]. Although articulated in an area roughly between the points used to produce [d] and [z], Italian [r] is a flap; that is, its manner of articulation is characterized by a rapid movement of the tip of the tongue from a point somewhere in the middle of the mouth against the alveolar region, and back again into a more central location. The full effect of the flap is produced only if the tip of the tongue travels sufficiently both before and after the point of contact. Thus, for example, in the nearly homorganic clusters [dr] and [zr], the apex of the tongue disengages itself from the production of the first consonant, lowers somewhat, and then returns to produce the flap, after which the tongue is lowered again. The point at which the tongue stops before and after the articulation of an r varies somewhat, but it is invariably in the mid-front region of the mouth, i.e. in the area used in the articulation of [e] or [ɛ].[10] It seems, therefore, that any assimilatory effects which Italian *r* could possibly exert upon a preceding vowel would be such as to achieve a degree of tongue height like that of [e] or [ɛ]. In the case of a low vowel such as [a], therefore, one would look for a following *r* to raise the vowel somewhat; precisely this occurred in Italian, and the full extent of the development will be outlined below. Conversely, given a high vowel such as [i] or [u], a following [r] would potentially lower the vowel; significantly, most well documented examples of purely phonetically motivated lowering enhanced by *r* involve high vowels.[11] Finally, in those cases where [e] or [ɛ] is followed by *r*, one would not anticipate this consonant to exert a powerful influence on the timbre of the preceding vowel. Thus, for example, while first-syllable atonic *e* in Italian was generally raised to *i*, it remained unchanged before r: compare *sĕcurus* > *sicuro*, *nĕpotem* > *nipote*, *mĕliōrem* > *migliore*, *mĭnorem* > *minore*, *prehensionem* > **prēsione* > *prigione*, *phoenīcem* > *finice*, etc., with *cerĕbellum* > *cervello*, *verĭcundia* > *vergogna*, in addition to other forms like *berbice*, *cervigia*, *mercante*, *mercè*, *sermone*, *pernice*, *serpentum* and such infinitives as *servire*, *cercare*, etc.[12] Meyer-Lübke (1890b: 78) also cites numerous forms where *i* was lowered to *e* before *r*, including *meraviglia*, *perucca*, *cerusico*, *laberinto*, *lucherino*, and *smeriglio*. Moreover, vowels were often inserted through hypercorrection or partial restoration, on the assumption that a vowel had been lost through syncope. Such an epenthetic vowel, being unstressed, was generally an *i*, except before *r*, where an *e* was inserted; e.g. *supplere* > *sopperire*, *cithăra* > *cetra* > *cetera*, *cammărus* > **gambro* > *gambero*, *măcrum* > *magro* > *maghero*, *mitra* > *mitera*, *sepăro* > *scevro* > *scevero*, Germanic *fōdr* > *fodero*, compared with *blasphĕmat* > *biasma* > *biasima*, *spasmo* > *spasimo*, etc.[13]

The full scope of evolutionary developments engendered by the presence of r does not emerge from anecdotal presentations of the sort found in historical grammars of Italian, but may be strikingly demonstrated by considering in greater detail the statistical data collected earlier. It was noted previously that, in view of the general concensus regarding a as a phonologically 'strong' vowel, the number of cases in which an unstressed a was modified, nearly always being raised to e, seemed disproportionately high. Similarly, e, considered to be a phonologically 'weaker' vowel, was not raised to i in as many atonic positions as might have been expected. These discrepancies may be traced to the fact that, in compiling the charts for Chapter Three, no reference was made to specific environments, except as regards general conditions of phonotactic compatibility. Consider, therefore, Table 38, which breaks down the evolution of a both before r and in other environments:

	initial pretonic	initial pre-pre-tonic	second pretonic	post-tonic penult
# examples before r	19	1	5	4
# raised to e	1	1	5	4
% raised to e	5	(100)	100	100
# other examples	5	12	13	3
# modified	0	0	0	1
% modified	0	0	0	(33)

Table 38: Italian atonic a before r

Here the effects of the following r are clearly seen, as well as the intrinsic strength of a in other environments, thereby strongly suggesting that the change of the theme vowel a to e before r in the future and conditional forms is not the result of coincidence. Further evidence may be adduced by considering the raising of atonic e to i, in terms of the presence or absence of a following r, as shown in Table 39:

	initial pre-pretonic	initial pretonic
# examples before r	7	15
# raised to i	0	0
% raised to i	0	0
# other examples	36	100
# raised to i	21	63
% raised to i	58	63

Table 39: Italian atonic e before r

Here it may be seen that the raising of atonic e to i was effectively prevented in the presence of a following r, thus documenting both the lowering tendency and the raising tendency which have been ascribed to r. As an interesting addition to the data regarding the raising of unstressed e, it may be noted that the presence of a following nasal served as almost as effective a deterrent to raising as did a following r, as indicated by Table 40:

	initial pre-pretonic	initial pretonic
# examples before N	9	27
% raised to i	0	19
# not before N or r	27	73
% raised to i	78	79

Table 40: Italian atonic e before r and nasals

This table indicates that, except when influenced by a following nasal or *r*, the vowel *i* may indeed be considered as the 'weakest' from the standpoint of diachronic developments.

The above predictions concerning the assimilatory properties of *r* are therefore in large measure borne out by comparing the evolution and development of various languages, and in particular, characterize with a high degree of accuracy the results in the phonological history of Italian, as demonstrated in the data presented above. In those cases where a reverse tendency is manifest, it is often possible to detect one or more additional circumstances which served to counteract the assimilatory properties of *r*, which to all appearances are not of a powerful nature. For example, the lowering of *e* to *a* before *r* in the future and conditional of some southern Italian dialects appears to be largely the result of morphological analogy with the predominant class of first conjugation verbs, as well as being influenced by more general phonotactic factors. Speaking of these developments, Meyer-Lübke (1967: 72) noted:[14]

> Il confronto tra *amare-hó* che muta l'*ar* in *er* (*amerò*) e *dormire-hó* chè conserva *ir* (*dormirò*) s'insegna la cronologia relativa di questi fenomeni: LABYRINTU era già diventato *laberinto* quando *dormire-hó* valeva ancora per due voci; conservando almeno un accento secondario sull'*ir* (e solo più tardi *dormire-hó* diventava *dormirehó*, ma, poichè allora gli *ir* non passavano più in *er*, s'arrestava a *dormirò*); invece, solo dopo la completa fusione di DORMIRE HÓ e AMA[illegible]HÓ ecc., MARGARITA diventava *margherita* (di conserva con AMAREHÓ *amerò*). Dunque IR *ir* è anteriore e AR *er* è posteriore alla fusione DORMIREHÓ, AMAREHÓ, ecc.

Similarly, those cases of early English lowering of *e* to *a* before *r* may find an explanation in the more retroflexed articulation of the English and Germanic *r*,[15] thus justifying Vennemann's classification of this variety of *r* as phonologically [+low]. In any event, the detailed properties of the Italian *r* are not captured by the presently available distinctive features since they depend not so much on the actual point of contact during articulation, but rather on the accompanying movement of the tongue which both precedes and follows the actual moment of contact. To accurately depict this characteristic, one would need additional descriptive devices, for example the introduction of a new feature such as FLAP, together with a set of synchronic and diachronic interpretive conventions indicating the interaction of this feature with other vocalic features.

5.7 *The role of stress*

Returning once again to the data from Italian first conjugation verbs, it will be noted that the various assimilatory properties proposed for *r* are not of an absolute nature; that is, there are hundreds of Italian words exhibiting the phonetic sequences *ar*, *ur*, *ir*, etc. In particular, the very endings of the first conjugation infinitives, in *-are*, serve as proof that, if any tendency on the part of *r* to raise low vowels exists, there also exist factors which effectively counteract this tendency. One obvious contender is analogy, but unfortunately the raising of *a* before *r* is not confined to verbal forms; in fact, Italian contains many non-verbal forms in which the same development ensued, as indicated in the preceding section. To cite but a few specific examples: *camăra* > *camera*, *camărus* > *gambero*, *mattăris* > *mattero*, *sarmento* > *sermento*, *comparare* > (dial.) *comperare*, *separare* > (dial.)

sceverare, *smaragdu* > *smeraldo*, *margarita* > *margherita*,[16], *lazzarelto* > *lazzerelto*,[17] etc. Bourciez (1967: 485) cites *albero* from *arbŏrem*, by confusion with *albărus*, thereby indicating the same tendency. What then is the common factor uniting all these words? Closer inspection of Tables 38 and 40 indicates that in each case, the *a* which was raised to *e* before *r* was *unstressed*; herein lies the key to a final solution. Italian, like the other Romance languages, has been shown to exhibit a highly differential treatment of vowels, depending upon the presence or absence of stress, Thus, Rohlfs (1950: §587) states that 'Das *e* (statt *a*) in der Infinitivendung ist bedingt durch die unbetonte Silbe in der Stellung vor *r*'.[18]

In Italian, it has been seen that vowels were often subjected to syncope, although not to the extent to be found in Spanish or Portuguese. Pei (1941: 38) notes that, even when the vowels are not syncopated, they generally exhibit some sign of weakening, often through a change in timbre. Of the vowels that were syncopated, the material presented in the preceding chapters indicates that the most easily lost were *i* and *u*. Significantly, in the future and conditional of the most common third conjugation verbs, the *i* is also syncopated: *dirò* from *dire*, *morrò* from morire, *parrò* from *parire*, etc.; this tendency was much more marked in the earlier stages of the language, as suggested by the remarks of Meyer-Lübke cited above. The vowel *e* was syncopated also, although probably after first being raised to *i*, especially in the future and conditional of many verbs of the second conjugation: *avrò* (early *arò*) from *avere*, *potrò* from *potere*, *vedrò* from *vedere*, etc. Most interesting, however, is the fact that *o* was hardly ever syncopated, except when previously raised to *u*, and *a* never fell through syncope.[19] In fact, certain words contaning unstressed i or u changed this vowel to o, in the process avoiding an encounter with syncope; for instance thymĭnus >temolo, ūvŭla >ugola, and so forth.[20] The tendency for a to resist syncope was demonstrated in Chapter Three, and has called forth many specific comments. For instance, Lausberg (1956: 156) noted:

> In den übrigen Berichten macht sich eine starke Tendenz zur Unterdruckung zwischen toniger Vokale bemerkbar, was mit ein Übertreibung der Druckabstufung zusammenhängt. Am widerstandsfähigsten ist allgemein der schallstärkste Vokal a.

Tekavčić (1965: 141) added:

> Per consequenza, benchè i verbi in -are facciano oggi il futuro e il condiz. affievolendo la vocale caratteristica a in e, la contrazione non avviene. Da ciò possiamo concludere che al tempo in cui è avvenuta la sincope e la conseguenta contrazione del lessema nei verbi in -ere, il futuro e il cond. dei verbi in -are conservavano ancora la vocale caratteristica a. La vocale a, essendo la più resistente alla caduta, ha resistito alla sincope.

5.8 Raising of unstressed vowels

Intimately linked with the shift of a to e before r in Italian is the more general process of unstressed vowel raising. It is a well known fact of Romance philology that, ever since the days of Vulgar Latin, unstressed vowels have shown a tendency to raise, a tendency which has operated with varying degrees of regularity among the various Romance languages. Raising of unstressed vowels attains its maximum dimensions in Brazilian Portuguese, where [a] > [ɐ], [e] > [i], [ɛ] > [e], [o] > [u], and [ɔ] > [o]. Similarly, in Catalan, unstressed [o] and [ɔ] are raised to [u], and unstressed [a], [ɛ], and [e] are raised to [ə].[21] In Spanish, the tendency to raise unstressed vowels was much less pronounced, although examples may be cited. The developments in Spanish were sufficiently striking, however, to prompt the following comment from Makoto (1971: 38), whose full impact may perhaps be ascribed to a faulty translation: 'In the age of transition from Vulgar Latin to Castilian there appeared a tendency to hate low vowels and prefer the most idealistic vowel system ...'. In Italian, as previously mentioned, *e* was quite regularly raised to *i* in pretonic positions, except before *r* and nasals, and sporadically raised, although more often syncopated, in other atonic positions. In literary Tuscan, there are few examples of the raising of unstressed *o*, but in the non-Florentine Tuscan dialects, as well as in the vulgar speech of Florence, this change is commonplace.[22] Unstressed *a* was generally not significantly modified in standard Tuscan, except in the cases before *r*. Somewhat raised variants, ranging from [ɐ] to [ə] occur in the spoken dialect, however, and are also found in other regional dialects. It is interesting to observe that unstressed vowel raising, which in itself is a form of phonetic weakening, followed roughly the same vocalic hierarchy characteristic of syncope in Italian; that is, *e* was most frequently raised, followed by *o*, with *a* seemingly being the most resistant. Of course it is difficult to discover the phonetic status of *a* during the earlier periods of Italian, for unlike with *e* and *o*, no letter existed with which to represent a raised *a*, much as in Portuguese. Equivalently, there was no other phoneme whose allophonic domain would be infringed upon by a raised variant of *a*. Nonetheless, the existence of the raising process is a documented fact in the history of Italian, from which it may be inferred that unstressed a was subject to a constant tendency toward raising, which was often resisted in reflection of the high position which this vowel occupies on the vocalic strength hierarchy. The combined tendency for an unstressed a to raise plus the potential raising and fronting properties exhibited by r, could then be expected to interact, and the e which often resulted before r, while not totally accounted for by these two factors, follows the established tendencies of the language.

5.9 The role of word position

Even when the assimilatory properties of r and the general raising of unstressed vowels are taken into consideration, there still remain certain data to be accounted for; namely, such forms as the future and conditional of dare, stare, fare, etc., which still preserve the atonic a before r. In order to bring these remaining forms under the rubric of an explanation, the phonotactic structure of the Italian word will be examined in greater detail. The key facts in this regard concern the distribution of stressed and unstressed syllables within the word. Except for a handful of unstressed monosyllabic forms, every Italian word receives a primary stress accent on one of its syllables. In addition, words of more than three syllables often receive some form of secondary accent. Using the symbol (') to indicate (primary) stressed syllables, and (-) to indicate unstressed or weakly stressed syllables, the possible structures characterizing the conditional and future verbal forms may be grouped as follows:

FUTURE		CONDITIONAL	
(-')	*darà*	(-')	*darei*
(-'-)	*daranno*	(-'-)	*daresti*
(--')	*parlerà*	(-'--)	*darebbero*
(--'-)	*parleranno*	(--')	*parlerei*
(---')	*perdonerà*	(--'-)	*parleresti*
(---'-)	*perdoneranno*	(--'--)	*parlerebbero*
(----')	*dimenticherà*	(---')	*perdonerei*
(----'-)	*dimenticheranno*	(---'-)	*perdoneresti*
.		(---'--)	*perdonerebbero*
.		(----')	*dimenticherei*
.		(----'-)	*dimenticheresti*
.		(----'--)	*dimenticherebbero*
.		.	
.		. .	
etc.		etc.	

In examining the above chart, as well as the data presented in Table 38, a pattern is seen to be emerging: *a* was raised to *e* before *r* when followed by the main stressed syllable and preceded by at least one unstressed syllable; in those cases where the *a* was in the first unaccented syllable, it remained unchanged; hence *darò*, *starò*, etc. Consider now the accentual patterns exhibited by some of the other words involving the development of the configuration of atonic *a* plus *r*, exemplified by the following:

(-'-)	*parare*
(--'-)	*margherita*

(-'--) ricovero

('--) maghero

.

.

etc.

In these examples, we find confirmation of the hypothesis derived from examination of the future and conditional forms; in addition, it is possible to see that raising of atonic a before r occurred in the mirror image environment: when immediately following the stressed syllable and followed by at least one unstressed syllable. Here then is a more useful sort of generalization, which specifies the precise environments in which raising of a was the general rule. Given these data, it is possible to formally display the results of this process in terms of a diachronic rule.[23] Consider, therefore, the form of a rule depicting the results of the interaction of a and r in Italian:[24]

$$(1) \qquad a \rightarrow e / \left\{ \begin{array}{l} VC_1 \begin{bmatrix} \rule{1em}{0.4pt} \\ -\text{stress} \end{bmatrix} r\acute{V} \\ \\ \acute{V}C_1 \begin{bmatrix} \rule{1em}{0.4pt} \\ -\text{stress} \end{bmatrix} rV \end{array} \right\}$$

Such a rule, while formally describing the observable data, is highly unsatisfactory for a number of reasons. First of all, it is necessary to state the rule in terms of two disjoint environments. Superficially, it looks as though there is another case of a 'mirror-image' rule as defined by Bach (1968); closer inspection reveals, however, that the notational devices proposed by Bach will not permit the two neighborhoods in (1) to be neatly and economically collapsed in an illuminating fashion. A new notational convention is needed which would permit the neighborhoods to be conflated. Such a proposal has in fact been offered by Naro (1971a: 58), utilizing a notational device first introduced by Langacker (1969: 858-9) and Harris (1970). Naro has suggested using a double slash // to indicate that what follows to the right is actually two mirror-image sequences. Using Naro's notation, (1) may be rewritten as:

(2) $$\mathrm{ar} \rightarrow \mathrm{er} \;//\; \mathrm{VC}_0 \underline{\quad} \mathrm{C}_0\acute{\mathrm{V}}$$

In reality, however, even this revised statement is not totally adequate, since the true consonantal environments are not correctly stated: the sequence *VCerCV́* is inconsistent with the Latin stress pattern carried over into Italian, while the pattern *VerCV́* is equally rare. A few examples of the latter case might be adduced, however, which would allow the rule to stand on formal considerations alone. As an interesting aside at this point, it might be noted that, taken as it stands, rule (2) appears to provide a clear counterexample to the claims of Naro (1971a) that *all* mirror-image rules are cases of neighborhood assimilation. Although one might wish to claim that the shift of *a* to *e* before *r* is due to a form of assimilation, there is nothing in the surrounding environment which may be interpreted as having exerted an assimilatory or dissimilatory influence on the sequence *ar*.

The restatement offered in (2) does not add any value to the analysis presented in (1), since the point is not to evaluate the simplicity or generality of a proposed description. The events in question actually took place, and the motivation for them has already been tentatively suggested. What is needed instead is a theoretical approach which will clarify the relationship between diachronic processes and formal representations. More serious than the descriptive shortcomings of (1) and (2) is the fact that these rules fail to reveal anything about the true nature of the process involved. Even allowing for the full expansion of all segments in terms of distinctive features and making provisions for the assimilatory effects of r along the lines suggested earlier, there seem to be two almost arbitrary conditioning environments. There is no indication of precisely what effect the configuration of stressed and unstressed syllables exercised upon the development of the sequence ar, nor why another configuration would not have produced the same results. These are questions which must be answered by any diachronic theory laying claim to completeness, and in the case under discussion, the proposed answers lie in a more detailed examination of the unstressed syllables of the Italian word.

5.10 Positional strength

Although each polysyllabic non-compound Italian word receives only one primary stress, the amount of articulatory energy allotted to each of the unstressed syllables, and hence their diachronic strength, is by no means uniform. The preceding chapters illustrated the fact that there is a clearly defined tendency for certain unstressed syllables to exhibit greater diachronic strength than others; most noteworthy is the initial pretonic syllable, which generally resists syncopation or other forms of effacement. Grandgent (1934: 91) feels that this preferential treatment may be due to a 'lingering influence of the Old Latin accent'. Final atonic vowels also fared better than many of their word-internal counterparts, despite their general weakness in terms of articulatory energy. Word internally, pretonic and post-tonic vowels fared worst, being subject to syncope and other forms of weakening, On the basis of such observations, a hierarchy of *positional strength* was established, accounting for the varying behavior of the unstressed vowels in a diachronic perspective. At least three levels of diachronic strength may be discerned from the outset; starting with the primary stressed vowels and secondary stressed vowels, this level may be referred to as [strength 3]. Next come final atonic vowels and initial pretonic vowels in medial position, which may be designated as [strength 2]. Finally, we come to word-initial pretonic vowels, and word-internal pretonic and posttonic vowels, the weakest of all, which for the time being will be called [strength 1].[25] Using this set of values, a partial reformulation of the above charts will place matters in a somewhat different perspective:

(2-3)	*darà*
(2-3-2)	*daranno*
(2-3-1-2)	*darebbero*
(2-1-3)	*parlerà*
(2-1-3-2)	*parleranno*
(2-1-3-1-2)	*parlerebbero*
(3-1-2)	*camera*
(2-1-1-3)	*perdonerà*
(2-1-1-3-2)	*perdoneranno*
(2-1-1-3-1-2)	*perdonerebbero*
(2-3-1-1-3)	*dimenticherà*
(2-3-1-1-3-2)	*dimenticheranno*
(2-3-1-1-3-1-2)	*dimenticherebbero*

.

.

etc.

From this chart, and from Table 38, it is seen that *a* was converted to *e* before *r* in precisely those positions in which it was assigned a positional strength of *1*. In these positions, the relative strength of *a* was weakest, and therefore the assimilatory effects of *r*, which did not operate on this vowel in stronger positions, could act to raise the *a* to *e*.

The notion of relative positional strength permits an obvious method of rewriting (1) and (2), namely as:

$$(3) \qquad a \rightarrow e \,/\, \begin{bmatrix} \underline{\qquad} \\ \text{strength } 1 \end{bmatrix} r$$

The statement embodied in (3) is a simple and concise representation of the fact that certain Italian future and conditional forms exhibit a vocalic alternation resulting from an evolutionary development which also encompassed other, non-verbal, forms. To a very large extent (3) is also a productive synchronic rule of modern Italian, accounting for the alternations in the first conjugation verbs, and stating a phonotactic generalization which holds true for most of the native Italian vocabulary. In its present form, however, it is nothing but a bit of shorthand notation, standing by convention for a complex series of historical developments, but devoid of any theoretical content. One must resist the temptation to interpret this formal notation as having inherent significance or causal powers.[26]

In order to propose that (3) is the correct representation for the events in question, it remains to be shown the manner in which such a notation may be made compatible with current phonological theory. More specifically, one must face the question of how the notion of positional strength is to be incorporated into the theory of diachronic description. The values of strength cannot be introduced directly into the phonological representations of the vowels. This follows from the fact that in their underlying representations, the vowels are unspecified as to stress, which is supplied later by a system of rules or conventions. Nor can a stress-assigning function be included as part of the general stress rules, since stress may shift within a derivational or inflectional paradigm, thereby causing a reassignment of the relative strength values. What appears to be needed is a set of interpretive conventions that will assign the correct values of positional strength relative to the main stress; i.e., which will be put into effect after the primary stress has been located within the word. Such conventions would take the form of phonotactic interpretive projections, which would serve to include a value of relative positional strength in the final specification of each vocalic segment occurring in a word or morpheme. Such projections must be largely language specific, in a case such as the one under discussion, forming in this case part of the metatheory of Italian grammar. As visualized in the present investigation, these interpretive conventions form an integral part of the grammar in question, and augment the effect of specific rules. Put into effect, they operate over the entire discourse, and as such may be properly considered as a type of 'meta-condition' which characterizes any utterance which a speaker might produce. In the particular case of hierarchies based on phonotactic position, the values assigned will not always find an exact match in the directly measurable phonetic properties of a word; for example, although the final atonic syllable may be assigned a strength value of 2 or perhaps even 3 relative to the primary stress, based on its historical tendency to resist apocope, it is often articulated as weakly as any word-internal atonic vowel. The values of strength reflect therefore not the actual physiological intensity, but rather the phonological behavior characterizing the vowels in the various positions, and established on the basis of historical observation.

Once primary stress has been situated in a word, either by means of lexical specification, or by rules of stress assignment, the relative phonological strength of the remaining vowels may be naturally accounted for by phonotactic interpretive conventions of the following canonical form:

(4) $$V \rightarrow [x_i \text{ strength}] \, / \, \underline{\quad\quad} X_i$$

where each $\underline{x}_i$ is an integer value, and the $\underline{X}_i$ are the specific phonotactic environments characterizing the different value of phonological strength.

The characterizations of word positions proposed for Italian are of course highly rudimentary in nature, and require many additions and corrections before a true phonotactic description of all Italian words can be achieved. For example, it will eventually be necessary to take into fuller consideration the particular consonants surrounding the vocalic environments, to account for possible assimilatory and dissimilatory effects which might be discovered. Moreover, provision will eventually have to be made for compound words, as well as for certain derivational forms in which the accentual pattern of the root word more strongly asserts itself. Naturally, if the theory is to be further refined to include such additional cases, it will be necessary to speak in terms of more than three levels of positional strength, in order to accurately characterize words with two or more word-internal atonic vocalic positions in succession, since in such cases a sub-hierarchy is usually evidenced by subtle diachronic developments.[27] Even in words like parlerebbero, the stress is not evenly distributed between the pretonic and posttonic vowel, although these differences are usually negligible.[28] Only a first step in this direction is offered by the remarks presented in this investigation, but the general directions have been indicated.

5.11 The vowel scale: a speculative interlude

Before the matter of incorporating strength hierarchies directly into diachronic rules is pursued further, a matter referred to earlier may be returned to briefly. In particular, the groundwork has been laid for a speculation regarding the problem of relative vocalic strength. In Chapter Three it was noted that, as regards resistance to syncopation in Italian, Spanish, and Portuguese, it is possible to group the vowels along a scale of strength, with a being the strongest, and i, closely followed by u and e, being the weakest. The question follows, therefore, of how this hierarchy might be represented in a grammar of these languages. As a preliminary note, it has been observed that this scale of vocalic strength enjoys a wider range of applicability than merely characterizing syncope in the Romance languages being studied. For example, in the process of unstressed vowel raising observed in Italian, Portuguese, and Catalan, a similar hierarchy is noticed, with i and u emerging as the results of weakening of e and o, respectively. In many dialects of Portuguese, the e which has been raised to i (or to [ə]) often falls in rapid speech, while the u resulting from o maintains itself. In Spanish, only the vowels a, e, and o normally occur word-finally; in the earlier history of the language, final u was converted to o and final i changed to e. In Catalan, unstressed [ə] often falls, while unstressed *u* invariably remains intact. The three vowels *a*, *o*, and *e* are the three strongest vowels on the suggested vocalic hierarchy. Further examples could perhaps be adduced regarding vowel nasalization, vocalization of consonants, and other similar processes, but the main point has already been made: that there exists a recurring tendency for vowels to behave in a manner suggesting an intrinsic hierarchy.

Following the proposals offered by Foley, values of vocalic strength could be incorporated directly into the phonological specification of each vowel; for example /a/ might be specified as [5 strong], and so on down to the lowest vowel on the scale, /i/, which might be denoted by the value [1 strong]. Processes involving vocalic strength hierarchies, such as syncope or unstressed vowel raising could then be formulated directly in terms of the feature of inherent vocalic strength. Such a system would explicitly portray the facts which have traditionally been assumed in manuals of Romance philology. It would, however, contain no explanatory value, being nothing more than a formalization of a number of observed facts. There would be no logical reason within such a system why, for instance, *o* does not normally weaken to *e*, which immediately precedes it on the posited strength hierarchy, or why *u* does not normally evolve to *i*. Any explanation seeking to establish answers to such questions will have to be highly tentative at best, since there are no guidelines to direct the investigation. At this point, however, it seems that there is potential gain to be realized from advancing a few observations along the lines of an eventual solution.

Central to the foundations of modern phonological theory is the concept that phonemes are not indivisible entities, but are simultaneous bundles of distinctive features. Therefore it is not unlikely that additional insight into the problem of vocalic hierarchies could be achieved by studying the interaction of the distinctive features comprising the Romance vocalic systems. Although the full vocalic system of Italian (and Portuguese) consists of seven vowels, only the five vowel *a*, *e*, *i*, *o*, and *u* normally occur in the unstressed positions under discussion. These vowels are ordinarilly specified as:

	a	o	e	u	i
high	–	–	–	+	+
low	+	–	–	–	–
back	+	+	–	+	–
round	–	+	–	+	–

Within this system, behavior patterns characteristic of each of the distinctive features may be detected. Consider, first of all, the vowel *a*, which is unique in being specified as [+low], or some equivalent specification. As noted above, *a* exhibits the greatest phonological strength of all the vowels under consideration. In the Italian dialect of Pescasseroli described by Saltarelli (1968), all atonic vowels are reduced to [ə] except for *a*, which remains intact. In mainland Catalan, unstressed *e*, *a*, and [ɛ] are reduced to [ə], while *o* and [ɔ] go to *u* in unstressed position. On the other hand, Mallorquín Catalan reduces unstressed *e*, [ɛ] and *a* to [ə], and *o* to *u*, but atonic [ɔ] is only raised to *o*. The feature of lowness thus seems to carry with it a certain measure of phonological strength which separates the low vowels from the remainder of the vocalic system.

In contrast to the status enjoyed by the low vowels, the high vowels *i* and *u* find themselves in an exceptionally vulnerable position in terms of diachronic development. These vowels are characteristically the weakest both in terms of syncope and as regards such processes as atonic raising and nasalization. In such cases, the feature of highness appears to contribute in a definite fashion to the relative weakness of the high vowels. On the other hand, there also exists a noticeable dichotomy front/back which separates vowels of the same degree of aperture. In general, it seems that the back vowels exhibit a greater degree of phonological strength; e.g., in terms of resistance to modification, than do the corresponding front vowels of the same degree of aperture. This discrepancy, while clearly emerging from the data, is not as striking as that existing between high vowels and mid vowels, and between mid vowels and low vowels.

The above remarks concerning relative vocalic strength, while not formed on the basis of universally valid data, characterize the vocalic evolution of Italian, and may be augmented by data from other Romance languages. That the tendencies established above are not purely fortuitous seems assured by the amount of confirmatory evidence which may be brought to bear. An attempt may therefore be made to fit these observations into the general theory of Romance phonology. Since clear patterns pointing to the individual and combined action of the distinctive features may be discovered, any theoretical proposals concerning vocalic strength hierarchies would have to account for these patterns. As a preliminary and highly tentative proposal in this direction, one might suggest that the grammar of Italian, or perhaps all the Romance languages, be augmented by an additional set of interpretive conventions that specify a phonological strength value for each of the relevant features in such a fashion that combining the strength values of each of the features in a given segment will yield a measure of the relative phonological strength of the entire segment. Some sort of interpretation rule will have to exist in any case, in order to deal with the various hierarchies characterizing consonantal lenition. What is being suggested here is that, instead of assigning a single strength value to an entire segment, the value of the segment would be a composite of the strength values of each of the individual features comprising the segment. In this fashion, the resulting strength hierarchies for classes of segments would lose some of their apparent arbitrariness, being shown to result from a principled interaction of the distinctive features. Such interpretive conventions would take the following canonical shape:

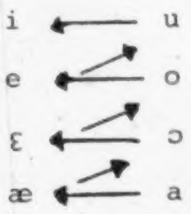
$$(5) \qquad \underline{aF_i} \rightarrow [x_i \text{ strong}] \, / \, \underline{\quad\quad}(X_i)$$

where *a* is the coefficient of the feature, whether +, -, or an integer, and the $\underline{X_i}$ are optional environmental descriptions which might be needed to characterize the behavior of certain features. For instance, the feature *round* normally occurs with *back* vowels, except for back vowels specified as *low*, i.e. *a*, in which case unrounded vowels are more common. In the case of the Italian vocalic system, one could assign a strength value of *1* to the feature specification [+low], a value of *½* to the specification [+back], and a value of -*1* to the specification [+high]. In this fashion, the vowel /a/ would have a strength of *1½*, /o/ of *½*, /e/ of *0*, /u/ of -*½* and /i/ of -*1*. The actual numerical values of feature strength are completely arbitrary; it is their proportional relationship which is important in establishing a vocalic strength hierarchy. When these strength values are added up, a total strength value for each vowel is arrived at.

It can be noted that the specification of [+high] as [-1 strong] and of [+low] as [1 strong] corresponds to the three degrees of aperture of a five vowel system. If, instead of two binary features, a non-binary feature of vowel height were used, it would be possible to specify the strength value of the height feature as:

(6) [n high] → [4-n strong]

Combining a scalar feature of height with an interpretive convention such as (6) involves an implicit prediction that vocalic systems with four degrees of aperture will also follow the above pattern, i.e. with increasing height being equated with decreasing phonological strength, and with the back member of each pair being stronger than the front member. Data from Portuguese partially confirm this prediction. Brazilian Portuguese raises atonic /ɛ/ to e and atonic /ɔ/ to o. Between these two vowels, /ɔ/ shows a greater ability to resist raising, second only to the resistance exhibited by /a/. The maximum theoretical prediction which could be extracted from the above proposal is that in a four degree system with eight vowels, the phonological hierarchy would be of the form:



At present there is not enough available information to verify or disprove such a prediction. In the event that such generalized hierarchy is found to be valid for one or more of the Romance languages, the theory of distinctive feature strength hierarchies, as well as the proposal of a scalar height feature, will receive additional support. In order to extend such a theory to include all the Romance languages, however, it will be necessary to make provisions for such vocalic types as front rounded vowels, which appear to be stronger than front unrounded vowels of the same degree of aperture, back (or centralized) unrounded vowels, nasal vowels, and so forth. Such an expanded theory would of necessity have to distinguish between the features of fronting and rounding, and might additionally require consideration of more than two points on the front-back axis. While nasalization of vowels will probably be determined by means of a vocalic hierarchy similar to the one outlined above, the feature of nasality itself might turn out to have a more feasible representation as part of a distinct nasal segment.

Interpretive conventions pertaining to individual distinctive features would depict the fact that different segments exhibit different values of characteristic phonological strength, and would relate these segmental strength values to the presence or absence of certain distinctive features. The strength values assigned to the individual features are not meant to replace the features themselves, but rather provide a parallel composite specification for each segment. Within such a system it is therefore possible to maintain a clear distinction between the interaction of features and the combination of feature strength values. Combinations and modifications of features, in addition to reflecting configurations of phonological strength values, are also constrained by both language-specific and universal conditions involving co-occurrence of features, implicational relationships, and so forth. Thus, for example, constraints regarding the reversal of the values of rounding and of front-back position will account for the fact that, all other things being equal, o and e more commonly reduce to *u* and *i*, respectively, and that the shift of *o* to *e* or of *u* to *i* is relatively uncommon, although involving contiguous points on the vocalic scale.[29] Viewed in this fashion, the vowel hierarchy does not represent a model of linear development for any one vowel, but rather a statement of the relative phonological strength embodied in each segment. The existence of a hierarchy does not by definition imply that an evolving segment will assume every value on the scale; for instance, intervocalic /d/ generally succombs to lenition before intervocalic /b/ among the Romance languages, yet /b/ does not ordinarilly evolve to /d/ during such a process, despite the fact that /d/ may be considered phonologically 'weaker' than /b/.

5.12 Conclusions

A theory of diachronic phonology which makes essential use of phonological hierarchies is clearly more desirable than one in which rules are stated in terms of seemingly arbitrary conditioning environments and developments. Based on the data from the history of Italian, an example has been offered of the characterization of a diachronic development in terms of strength scales. Further investigation is called for before such proposals can be admitted into phonological theory. Clearly the burden of proof falls on anyone wishing to introduce new proposals into an established theory. Despite the remarks contained in this chapter, the burden still remains. In view of the complexity of phonological change, it appears certain that the current view of diachronic phonology will have to be expanded to include at least some new proposals; phonological hierarchies seem to rank in the list of possible additions.

Notes to Chapter Five

1 See also Izzo (1972: 164).

2 Cf. Bec (1970: 151-2).

3 Taken from the facsimile edition Alberti (1964).

4 Cited from Bembo (1955: 148).

5 Cf. the facsimile editions W. Thomas (1968), Granthan (1968), and Florio (1969), respectively.

6 See the discussion in Migliorini (1963: 471).

7 The version edited by Bellucci (1967: 104) lists other variant forms occurring in the available manuscripts, including *marcherà* and *mancherrà*.

8 Cf. Muljačić (1966, 1969: 396), Saltarelli (1970a).

9 *Ibid*.

10 Actually the central point reached in the articulation of *r* may be somewhat more centralized than the front vowels. For example, in Rumanian, the vowels *e* and *i* generally exhibit the centralized allophones [ə] and [ɨ], respectively, before and after *r*, variants which correspond to the vowel phonemes orthographically represented as *ă* and *î*, respectively (cf. Vasiliu 1968: 130, Ruhlen 1973: 39, 41).

11 See Vennemann (1972: *passim*.); for Spanish see Navarro Tomás (1966). Newton (1972a: 569) notes the lowering of *i* to *e* before *r* in a modern Greek dialect.

12 Cf. the discussion in Meyer-Lübke (1890b: 78).

13 Cf. Grandgent (1927: 55, 60).

14 It should be noted at this point that there is no evidence indicating that the shift of *ar* to *er* took place any earlier in the verbal forms than in other words; indeed, traces of this change involving nouns are recorded from the earliest periods of Italian, and if Meyer-Lübke's observations are nor erroneous, probably antedate the complete fusion of the Vulgar Latin analytic future and conditional forms into the synthetic forms in which the stem variation *ar-er* is exhibited.

15 Cf. Vennemann (1972: 872) and Kurath (1964: 78) for a fuller discussion of the lowering influence of English *r*. A similar situation seems to have occurred in French Canadian, where the influence of a following [R] sometimes caused *e* to be lowered to *a*; e.g. *merdam* > *merde* > [maRd]; standard French *merci* > [maRsi]. For further discussion, see Orkin (1971: 66) and the *Glossaire du Parler Français au Canada* (1968).

16 See d'Ovidio and Meyer-Lübke (1904: 671) and Pei (1941: 39).

17 Cf. Bec (1970: 152).

18 Cf. also Lausberg (1956: §293, 845).

19 See Menéndez Pidal (1966: 67) and Grandgent (1934: 98).

20 Cf. Grandgent (1927: 58).

21 See Griera (1913), Kuen (1932: 122), Badía Margarit (1951: 19), Moll (1952), Lleó (1971), Vogt (1971), Phelps (1972).

22 See Grandgent (1927: 44).

23 The term 'rule' here is not to be interpreted in the strict generative sense as advocated, for example, by King (1969a) and Halle (1962), who view sound change as the addition of integral 'rules' to the formal grammars of the speakers of the language. A change such as the one under discussion is highly complex and evidently results from the interlocking action of a number of diverse phenomena. It is quite unlikely that any such 'rule' could be incorporated as a whole into the grammar of Italian speakers; rather, the change portrayed in (1) is the end result of a process which eventually required several centuries for consummation. As a consequence, the statement presented by (1) (and the following refinements) is merely a schematic representation of a 'metachronic equation', giving the before and after states and saying little or nothing about the intervening events. In particular, there is no claim to the effect that (1) represents a single change which could be portrayed as the formal addition of a single 'rule' to a previously existing grammar.

24 The development of smaragdu to smeraldo may be accounted for by the fact that, particularly in the early stages of the language, the initial s of such clusters had syllabic value. See the discussion in Bourciez (1967: 48, 156) and Andersen (1972: 34).

25 Saltarelli (1970b: 94) calls for the secondary accent to fall on pretonic vowels and the tertiary accent to fall on unaccented pretonic syllables. These conclusions do not find support in the historical developments affecting the syllabic structure of Italian words. In addition, it must be recalled that positional strength is not to be strictly equated with accentuation, though the two are related.

26 Cf. Nietzsche (*The Will to Power*, p. 294), talking of 'our bad habit of taking a mnemonic, an abbreviative formula to be an entity, finally as a cause', and Wittgenstein (*Philosophical Investigations*, pp. 37-8): 'The fluctuation of scientific definitions: what to-day counts as an observed concomitant of a phenomenon will to-morrow be used to define it'.

27 Cf. Menéndez Pidal (1966: 74).

28 This is discussed at greater length in Pope (1934: 112).

29 Except by passing through the intermediate stage of a front-rounded vowel such as [y] or [ø], as in the evolution of French. This process of fronting, however, does not appear to be a form of phonological weakening; in French, also *stressed* vowels were fronted. More knowledge of the interaction of the features of fronting and rounding is required before the problem can be discussed in detail. The unrounding of front rounded vowels does appear to constitute a form of weakening.

CHAPTER SIX
IN CONCLUSION

6.1 Summary of results

The separate studies which have been realized as part of the present investigation have had as their common goal the establishment of a rigorous formulation of two diachronic phonological hierarchies which played a role in the formation of the Romance languages. The first hierarchy concerns the relative position of atonic vowels within the word; the second, the intrinsic diachronic strength of the various vowels comprising the Romance vocalic systems. Based on statistical data drawn from Italian, Spanish and Portuguese, further bolstered by observations from Catalan, and considered in terms of resistance to syncopation and modification, the non-final atonic positions may be ranked along the following relative scale of strength, beginning with the strongest: initial syllable, internal pretonic syllable, posttonic penult syllable, and intertonic syllable. Based on intrinsic diachronic strength, the five vowels under consideration may be ranked as follows, in order of decreasing strength: /a/, /o/, /e/, /u/, /i/.

The final atonic vowels underwent a different fate in the Romance languages under study, perhaps in view of their function as morphological markers. While in most cases remaining intact in the languages surveyed, except for Catalan, the overall rate of loss of final atonic vowels appears to be directly proportional to the rate of loss of atonic vowels in non-final positions in each of the four languages. From these comparisons comes a relative weighting of unstressed vowel deletion and preservation of morphological material, two competing factors attecting final vowels.

Also taken into consideration were factors of phonotactic compatibility, which act to ensure that consonant clusters brought into being by the loss of a vowel will be compatible with the phonotactic structure of the language. Atonic vowel loss occurs, in the overwhelming majority of cases, only in those instances where loss would produce a structurally compatible cluster. By further breaking down the possible clusters into those which would result in open or closed syllables, the relative efficacy of the process of vowel deletion with respect to open syllabicity was assessed.

In an attempt to demonstrate the feasibility of incorporating a phonological hierarchy into the study of phonological change, the hierarchies previously isolated were applied to the problem of vocalic modifications in certain future and conditional forms of Italian first conjugation verbs. Incorporation of these hierarchies into the discussion yielded a clearer and more complete characterization of the change, illuminating the interaction between the influence of contiguous segments and relative position within the word.

6.2 The place of hierarchies in phonological theory

6.2.1. Introduction. In the introductory sections of Chapter One, it was noted that, as presently conceived, phonological hierarchies could be incorporated into phonological theory in one of two ways. In the first possibility, the hierarchies themselves were used to define phonological segments, replacing such theoretical constructs as distinctive features, morpheme boundaries, etc. Viewed in this fashion, hierarchies would in themselves define phonological change, since all change would be regarded as a shift of the numerical values of the hierarchy. The second possibility regarded the hierarchy as a metatheoretical index, an interpretive convention acting upon, but not replacing, established phonological data. The numerical values of the hierarchies would interpret series of phonological developments, acting complementary to the actual phonological definitions.

In Chapter One, it was stated that, for the reasons presented at that time, this study would employ the methodology whereby phonological hierarchies were regarded as metatheoretical interpretive devices rather than as phonological features, a practice which was illustrated in Chapter Five. At the completion of this investigation, it is hoped that the reasons for this choice are more apparent.

6.2.2. Hierarchies as theory. Fundamental to any empirical investigation is the testability of any hypothesis or claim that might arise from it. In the case of diachronic linguistics, the proposed concept of a phonological hierarchy is a theoretical hypothesis, and as such must be formulated in a fashion conducive to further testing, in order to remain within a strictly scientific methodology. While it is not essential that every observation realized in a historical linguistic study be immediately translated into a testable hypothesis, such a practice must be followed if a new proposal is to be added to the theory. Thus, the goals of this investigation dictate that the proposal of diachronic hierarchies be put to the test. In order to test the validity of a proposed hierarchy, this hierarchy must itself be established on the basis of one set of data, and then tested by comparison with a second, distinct, set of data. In the event, however, that one assumes the hierarchy itself as defining the phonological elements, such verification is impossible, since one is assuming, purely axiomatically, that the hierarchy has already been empirically established, a counterfactural assumption.

On the phonological level, statements regarding hierarchies take their place among more traditionally recognized entities such as distinctive features. In order for numerically-organized phonological hierarchies to supplant phonological distinctive features, it would have to be conclusively demonstrated that the hierarchies could not only account for the same phenomena presently used as evidence in favor of the use of distinctive features, but also account for additional phenomena, or account for the same phenomena in a more enlightening fashion. To date, no such verification has been undertaken. Certain examples have been offered in which numerical hierarchies may conveniently account for changes in a simpler fashion than in a description making exclusive use of distinctive features. To extrapolate from such cases, however, to the general claim that hierarchies can, and indeed should, replace distinctive feature matrices in the phonological representation of individual segments is unjustified. The only method currently available by means of which numerical hierarchies can be made compatible with more traditional distinctive features is to define the former in terms of the latter; this practice, while yielding the desired results, is circular.

6.2.3. Hierarchies as metatheory. The present investigation has sought to demonstrate the ways in which a theory of phonological hierarchization can be made compatible with a theory making essential use of distinctive features. By regarding the hierarchical structure of phonological elements as representing a metatheoretical level separate from the level of phonology, the concept of hierarchy can play an interpretive role during investigations, while allowing the distinctive features to do the work of defining the phonological system under consideration. By maintaining such a distinction between theoretical levels of discussion, the concept of phonological hierarchies may be fitted in among other possible factors which can globally affect a language undergoing change. For example, the behavior of vowels relative to conditions of phonotactic compatibility can be neatly visualized when the vowels are defined in terms of their position within the word, as well as by their inherent phonological characteristics. On the other hand, certain changes operate over groups of segments in such a manner as to suggest the interaction of phonological distinctive features; there is no non-arbitrary method of capturing such behavior patterns in a system of phonology in which distinctive features are completely replaced by hierarchical values.

The behavior of final atonic vowels in the Romance languages which have been studied can be viewed on two separate planes: the plane of phonology, indicating the behavior of the individual vowels, and the plane of phonological hierarchization, in which it can be demonstrated that morphological considerations entered into the picture to effect a diachronic strength value different from that which would be predicted on purely phonological grounds.

6.2.4. Psychological implications. More serious, however, than the descriptive consequences of adopting a system of phonology composed solely of hierarchical elements, are the psychological implications inherent in such a choice. Most phonologists, with a few noteworthy exceptions,[2] have maintained that distinctive features must represent some psychological behavior pattern observable in native speakers of a particular language. The features that have been proposed are often based on articulatory correlates, and sometimes on acoustical correlates as well; their purpose is the elucidation of the bridge between the level of individual sounds and the level of significant sounds. Such features have generally been justified by means of groupings of segments observed during sound change, and by the intuitions of trained linguists or others versed in the rigorous description of language. Only more recently have experimental data been used to test the proposed distinctive features, occasionally with rather surprising results.[3] However, even given the current disparity of results in the realm of distinctive feature theory, the very search for a set of universal correlates betrays the need to see such features as possessing psychological, as well as physical, reality.

In order to implement a system of phonology in which hierarchical values based on historical observations or indirect observations of synchronic alternations replace distinctive features, one must demonstrate that native speakers respond to, and produce, segments in accordance with such considerations. At present, it seems highly unlikely that any such demonstration could be made, given the extreme difficulty experienced in trying to assess native speakers' intuitions about even the simplest phonological matters. To expect a speaker to phonologically categorize a segment in terms of an index representing the cumulative result of historical change is to presuppose, for the human race, a sort of universal consciousness, a proposal which while perhaps true, is as empirically unverifiable as the controversy concerning the 'innateness' of 'linguistic universals'. Replacing distinctive features by numerical hierarchies in effect seals off the phonological system from empirical verification, and therefore is unacceptable as a methodological alternative to a system in which hierarchical values are viewed as compatible with a set of distinctive features.

6.3 Representing the hierarchies: diachronic variable rules

6.3.1. Segmenting the data.

Once a phonological hierarchy has been isolated, and the level on which it is to be represented has been agreed upon, there remains the problem of the manner in which the hierarchy itself is to be represented. Since the action of a strength hierarchy can only be observed through numerical measurements concerning the behavior of segments across time, or numerical counts of synchronic alternations, the hierarchy itself is numerical in nature, representing a function whose assumed values are the statistical results of the observations. In representing the hierarchy, however, it is necessary to make the choice between two methodological alternatives: first, to define the hierarchy in terms of discrete steps of 'strength'; second, to somehow incorporate an exact numerical value into the representation of the hierarchy.

6.3.2. Hierarchies as step functions.

In all the literature on phonological hierarchization which has appeared to date, it is the first of the above alternatives which has been adopted: generalizations offered on the basis of large segments of diachronic behavior are used to yield a discrete numerical scale of strength, resonance, closure, or some similar scalar category. Such discrete steps represent the arbitrary partitioning of a continuum, but if such partitioning is carried through in a principled fashion, it is possible to achieve useful results.[4] Halle (1954: 197) offers the following justification for one such partitioning, the breaking up of a continuous stream of speech into phonetic (and phonological) segments:

> Although the view of language as a continuous phenomenon is simple and straightforward from a strictly physical standpoint, it has certain inherent difficulties which make it undesirable as a basis for description, and investigators of language ... have usually preferred to describe language as a sequence of discrete events. Furthermore, it is not necessary that a physical phenomenon be actually discontinuous in order to break it up into a sequence of discrete events. It is possible to divide it into segments if we can show exactly how it is to be done.

It is this view toward segmenting a continuum of linguistic data which underlies much of current phonological theory, whether one chooses to define features as singulary, binary, or multinary. In a similar fashion, one may wish to segment the continuously variable data regarding phonological hierarchization. For example, given a system containing _n_ phonological elements, and given numerical data regarding the hierarchical behavior of these elements across time, one may partition the numerical results so as to arrive at an _n_-valued step function, defining a single point on a hierarchy for each of the phonological segments. More specifically, given data regarding the behavior of five vocalic segments, one may rank these data along a scale containing the discrete values 1 through 5; alternatively, one could choose to group certain numerical values, so as to arrive at a smaller number of discrete steps on the resulting hierarchy. In the latter case, some sort of principled criterion must be upheld for placing two or more distinct statistical values under the rubric of a single point of a hierarchy.

Despite the literature apparently attesting to the contrary, such segmentation of a continuum of data is incompatible with a phonological system replacing distinctive features by the discrete values of hierarchies. This is the case since the primes defining the points on the hierarchy and serving to supply the points of segmentation are the phonological elements themselves, defined in terms of distinctive features. If such distinctive features are claimed to be of no value, however, it is impossible to non-arbitrarily segment the data to yield a new set of hierarchical values to be used in replacing the distinctive features. Thus, the replacement of distinctive features by numerical hierarchy values makes implicit use of the prior segmentation afforded by classification in terms of distinctive features, and is consequently circular and methodologically untenable.

6.3.3. Hierarchies as continuous variables. In contemporary linguistics, increasing interest is mounting toward accepting linguistic behavior as continuously variable rather than attempting to discretely quantize all linguistic data, thus effectively eliminating much of the methodological distinction between competence and performance. The application of statistical methods to linguistics is not a new development: numerical computations have long been used to provide quantitative characterizations of style. More recently, however, it has been more widely noted that linguistic behavior is not always characterized by discrete categories, that rules do not generally apply in every possible case, that sound changes do not generally affect every potentially affected segment. Rather than trying to compartmentalize these continuously variable data in order to regularize them, many investigators have sought to incorporate the statistical figures into their linguistic descriptions, to provide a fuller view of linguistic possibilities. This methodological trend is most noticeable in the field of sociolinguistics, where, among other uses, the incorporation of statistical results has led to one proposal of central importance: the concept of variable rule.

6.3.4. Variable rules. The original proposal of variable rules, together with most of the concrete suggestions which have been put forward concerning their implementation, are the work of William Labov. Labov first introduced the idea of variable rules to account for the apparently random behavior of certain Black English speakers with respect to rules of copula deletion, final cluster simplification, and various rules involving negation.[5] What Labov sought was an empirically more satisfying alternative to the concept of 'optional rules' or 'free variation', by showing that the frequency with which a given 'optional' rule was allowed to act could be correlated with additional factors, such as age, social group, style, register, etc. In essence, what Labov proposed is that each such rule be represented together with a numerical quantity indicating the percentage of cases in which this rule may be expected to apply over large expanses of verbal production. Labov defines variable rules as follows (1971: 465): 'The first step is to assign to each rule a quantity ϕ ranging from 0 to 1, representing the proportion of cases in which the rule applies out of all those cases in which it might have applied. For obligatory rules, $\phi=1$, and for optional (or variable) rules, $0<\phi<1$'. He further notes (1971: 469) that 'these regularities are observed in the production of language, but from the hearer's point of view, they may seem insignificant'. In subsequent work, the concept of variable rule has been further refined by admitting into the numerical quantity a factor indicating the exact nature of interference with the normal action of the rule. Labov (1972: 112) notes: 'To each [variable] rule ... we give an automatic interpretation that $\phi=1-k_o$, where k_o is some factor which interferes with the rule going to completion'. These factors of interference are further sharpened by the inclusion of 'variable constraints' (1972: 116):

> For a variable rule without any variable constraints in the environment, we have noted that $\phi=1-k_o$. The variable constraints are written so that the presence of the feature indicated favors the rule; that is, they diminish the limiting factor k_o: $\phi=1-(k_o-\alpha k_1-\beta k_2 \ldots -\nu k_n)$ where the Greek letters have their usual + and - values and the constants $k_1 \ldots k_n$ are ordered so that $k_1>k_2>\ldots>k_n$.

Labov has opened the possibility of adding a hitherto unexplored dimension to linguistic methodology. At the present time, however, Labov's proposals are backed by little empirical evidence, other than his own data concerning a restricted range of sociolinguistic phenomena,[6] and the proposed format of variable rules has led to serious contentions about their lack of feasibility. It has been claimed, for example, that naive speakers do not respond to numerical frequencies to the degree presupposed by variable rules; moreover, accepting the validity of variable rules creates a host of problems in the area of language acquisition, all centering around the crucial question: how does a speaker learn the 'variability' of a variable rule? Does he learn this variability through listening to the speech of those around him and then generalize on the basis of what he hears? If this is the case, it seems to refute Labov's observation (1971: 469) that variable rules are consistently noticeable only in the production of speech, and are often not perceived as such by the listener.

A much more categorical objection to the concept of variable rules was voiced by Bickerton (1971: 460):

> If we accept the variable rule principle, we must also accept that the mind possesses not only the apparatus necessary for forming two quite different types of rule, but also some kind of recognition device to tell the speaker whether to interpret a particular set of data as rule-plus-exception or as area-of-variability. When we recall that the data on which NON-variable rules are based is often incomplete and heterogeneous, the mode of operation of such a device must seem somewhat mysterious.

Some of Bickerton's objections may be dismissed by refusing to countenance the distinction between exceptions to obligatory rules and variable rules. In other areas, however, it must be conceded that the points that Bickerton has raised have not been satisfactorily clarified by those who would incorporate variable rules into their descriptions. The exact operation of a variable rule has never been clarified; merely proposing a canonical form in which such rules might be formulated, if they in fact exist, does not answer the more crucial ontological question posed by the proposal itself. In the work presented to date, it has never been made clear whether variable rules were merely a formalization of statistical results, or whether they were supposed to respond to some psychological correlates brought into play during speech. In the event the latter interpretation is offered, and only in this case would the concept of variable rules be empirically meaningful, a number of psychological questions are raised, questions which have not yet been answered. Perhaps the greatest conceptual difficulty lies in the quantitative aspect, that a speaker could learn rules which are in some sense 'optional', but still learn that some rules are more 'optional' than others. By way of an apology, Labov (1971: 494) notes, in answer to a query by Lightner:

> On the question of numbers ... the numbers game is quite irrelevant, ... what we are looking for is the same thing that all linguists are looking for, viz.; relations. There are times when people go to excess ... in looking at quantitave relationships which are finer than the system would seem to support. The fundamental postulate of linguistics is that some utterances are the same and that implies that there exists free variation among these utterances that are the same... What we observe is that relationships of more or less than are all that count.

Bickerton, on the other hand, has another hypothesis concerning variable linguistic behavior. He believes, and supports his beliefs with data drawn from the English creole dialect of Guyana, that 'inherent variability may be regarded as a developmental phase coming between two categorical phases' (p. 487). In other words, Bickerton feels that rules tend to change from categorical status to categorical status, but since most rule changes are not effected in toto, the resulting intermediate stage between two categorical rules accounts for the principled variation observed by Labov and others. This view finds support in the data regarding the social stratification of New York English reported in Labov (1966), where the age-grading technique indicates a number of rules, each asymptotically approaching a categorical rule, in differing stages of variability. It still leaves unanswered, however, the pressing question concerning the psychological status of variation. Bickerton, while differing with Labov on several issues, is aware that variation can be of a principled nature; regardless of the ultimate reasons for such principled variation, one must still face the problem of precisely how such variation is manipulated by speakers and listeners. It is at this juncture that the study of variable rules has halted, for current linguistic research has not gone beyond the formalization of a number of hypotheses to account for quantitative data.

The possibility of formulating some sort of variable rule appears to be a feasible consequence of contemplating the incorporation of statistical data into the representation of a diachronic hierarchy. In all of the linguistic studies which have made use of variable rules, these rules were posited as existing on the synchronic plane, being, in fact, highly individual representations. When dealing with phonological strength hierarchies, where the data come from diachronic observations, one faces the possibility of formulating a diachronic variable rule, whose empirical consequences may be quite different from variable rules conceived in the synchronic dimension.[7] Unlike a synchronic rule, which may be individually correlated to the linguistic output of a number of different speakers, diachronic rules nearly always represent the overall effect of linguistic change on a speech community, although slight differences may exist between individual speakers. Thus, right from the outset, one of the fundamental problems facing synchronic variable rules, namely the problem of how to represent the various quantitative data in the competence of individual speakers, is irrelevant when dealing with diachronic data. Bickerton (1971: 488) noted, in this connection:

> It will soon become apparent that the only place to look for system is in system--in an ongoing process of linked changes moving through space and time which form an abstract background to which the linguistic behaviour of individuals, groups and communities may be referred--rather than in any concrete individual, community, or group.

From this, one may conclude that data regarding diachronic phonological hierarchization, data which represent a large cross-section of linguistic behavior both across time and across space, may conceivably be representable directly in the form of a diachronic rule, without the difficulties inherent in trying to represent such data in the grammars of individual speakers.

When attempting to apply the statistical data of diachronic hierarchization to the overall diachronic description of a language, one is faced with a choice of where to incorporate these data: in the rules themselves, or in some sort of supplementary description.

It is useful to briefly consider the difference between these two modes of representation.

6.3.5. Hierarchies as variable rules. If the numerical data of the hierarchy are applied directly to the individual diachronic rules, the result will be the diachronic equivalent of the variable rules proposed by Labov to account for synchronic variation. In the particular cases under discussion, loss of atonic vowels among certain Romance languages, such rules would be of the following canonical form:

(1) $\forall \rightarrow \emptyset \,/\, X\underline{\quad}Y \quad \langle\phi\rangle$

where X ... Y signifies the particular environment specified by the rule, and $\langle\phi\rangle$ indicates the numerical percentage of application of this particular diachronic rule. Methodologically speaking, such a rule would be easy to formulate: one would simply add the results of statistical computation to the basic diachronic rule to obtain the 'diachronic variable rule', expressing formally the result of the variable application of the rule during the history of the language. Empirically, however, the relevance and usefulness of such a rule may be questioned.

Since one is not dealing with synchronic data, nor with the behavior of individual speakers, such a diachronic variable rule is inherently tautological, and tells us nothing about the rest of the language. The intrinsic interest of a synchronic variable rule is that it embodies predictions about the way a given speaker might react to a particular speech situation, as well as predictions about the overall behavior of an entire linguistic community under a specified set of conditions. Its diachronic equivalent, however, due to its relatively greater distance from individual, synchronic linguistic data, embodies no such predictions: the rule merely states that, in a certain environment, x% of all potentially affected forms were acted upon by the rule. This statement, while more precise than a purely qualitative remark contained in a historical grammar, is of no inherent interest to linguistic theory, since it provides no new possibilties for investigation.

A further difficulty to be noted in a diachronic variable rule of the general form (1) concerns the incorporation of strength values reflecting hierarchization of segments based on their intrinsic phonological content. In the particular case under discussion, loss of atonic vowels in the Romance languages depended not only upon relative position within the word, but also on the timbre of the vowels themselves. Thus, for each rule representing a particular atonic environment, the function ϕ would have to assume as many discrete values as there are different vowels under consideration. Such a practice would completely obscure the essential similarity of elements linked by a strength hierarchy, whether based on relative position or on intrinsic phonological content.

6.3.6. Hierarchies as variable metarules. The other possible way of representing a phonological hierarchy in the diachronic grammar of a language is to include a set of interpretive statements concerning the overall strength of the segments or positions under consideration. Since any hierarchy under consideration is a ranking of segments, or positions, rather than individual rules, the most direct way to express the hierarchy is by means of an explicit statement of the nature of the individual events. More specifically, consider the incorporation, into the historical grammar of a language, of a set of meta-statements or metarules or the following kind:

$$
(2)\qquad \begin{array}{ccc}
[X_1] & \rightarrow & (x_1) \\
[X_2] & \rightarrow & (x_2) \\
 & \cdot & \\
 & \cdot & \\
 & \cdot & \\
[X_n] & \rightarrow & (x_n)
\end{array}
$$

where the symbols $[X_i]$ represent the elements of the hierarchy, e.g., segments, positions, etc., and each symbol (x_i) is a numerical quantity less than or equal to 1, where 1 is considered as the reference value representing the strongest element of the hierarchy. The quantities (x_i) are thus not percentages of application of particular rules, but rather quantitative statements regarding the overall strength of the individual elements. Such quantitative figures are not absolute, but rather relative, showing the behavior of each element on the hierarchy relative to the other members. As such, these figures are difficult to arrive at, since they necessitate the calculation of proportional values for a number of different phenomena; ideally, every diachronic process affecting the language and segments under discussion. Once arrived at, these figures would embody a number of predictions concerning the behavior of the language during phonological change.

Since the numerical values associated with each member of the hierarchy are theoretically independent of any particular change, this mode of representation suggests that, all other things being equal, elements of the hierarchy will exhibit the same relative behavior, regardless of the sound change involved. This is suggested by the data which have been reported in the preceding chapters; in fact, if the notion of phonological hierarchy has any real empirical substance, it is required that the relative proportions remain nearly constant, since it is this constancy which defines a hierarchy in its most general terms:

DEFINITION: A representation of the form (2) is a diachronic phonological hierarchy if and only if, for every diachronic rule containing one or more of the elements $[X_i]$, the relative proportions of the corresponding figures (x_i) remain constant, within a specified tolerance.

The area of tolerance will have to be determined individually for each case under consideration and will of necessity be arbitrary, except in the case of an error factor of zero; as in statistical theory, it should be possible to arrive at a common concensus concerning the largest tolerable error possible to remain within the bounds of the definition.

In terms of the intrinsic possibilities for further research and prediction about the diachronic behavior of a language, a representation such as (2) seems to afford the greatest promise for the incorporation of phonological strength hierarchies into linguistic theory. Hierarchization of phonological elements is an area in which quantitative data must be introduced directly into a linguistic description; these data must be presented in a manner which depicts their relations with the entire language, not just with specific events. If in fact a true hierarchical arrangement exists, then the generalized hierarchy should stand up to comparison with specific data, and as a consequence, lend itself to additional cases where it may be used to characterize some phenomenon whose initial description is based on other data.

Notes to Chapter Six

1 Cf. Hall (1950, 1963), Posner (1967).

2 For example, Hjelmslev (1961), Fudge (1967), Twaddell (1935), and Bloomfield (1933). For some ideas in favor of using physiologically motivated distinctive features, see, for example, Delattre (1967). Cf. also Delattre (1969), Halle and Stevens (1964), and Ladefoged (1969), For more general remarks concerning the empirical correlates of distinctive features, see Brozović (1967), Fant (1967), Halle (1964), Jakobson (1939), Jakobson et. al. (1963), Ladefoged (1966), McCawley (1967), Malmberg (1955) and Wheeler (1972).

3 For example, the experiment reported in Derwing (1973: 316-21). In this experiment, subjects were asked to group together phonetic phrases (CVC in the cases of vowels, VCV in the case of consonants) by means of the 'concept formation' technique. The set of consonant stimuli were divided so that one group would highlight the feature of voicing, another, the feature of continuity, while a third group would contain a random arrangement of consonants. Measurement of the degree of difficulty encountered in arriving at the 'concepts' indicated that the feature of continuance was easily recognized, while the feature of voicing was seldom isolated as the key concept. Among the vowels, the front-back distinction was recognized more frequently than the high-low distinction.

4 In another defense of discretely quantizing statistical data into the form of phonological rules, Householder (1967: 942-3) notes, with regard to the possibilty of a rule's expressing variation over a continuum:

There seems to be at least the possibility ... of rules like:

[+ nasal] → [k nasal] (.94 > k > .32, distribution normal)

where k specifies the degree to which the velum is lowered or the proportion of the segment during which it is lowered, or something of the sort. If this were so, then the output of the grammar could be considered to correspond to individual utterance-tokens; it is more commonly supposed that the output should rather correspond to utterance-types; i.e., classes of utterance-tokens. Tokens would be relevant perhaps to a performance model, but not to a competence model.

5 Cf. Labov (1969), Labov *et*. *al*. (1968).

6 For further discussion, from a more recent perspective, see Cedergren (1970), Cedergren and Sankoff (1972), Sankoff (1972).

7 For some rudimentary considerations on the possibility of diachronic variable rules, see Fought (1973).

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APPENDIX
LATIN-ROMANCE ETYMOLOGIES

(Corrected derivations from the REW)

Latin-Italian

Latin	Italian	Latin	Italian
abăcus	abbaco	aescŭlus	ischio
abatĭssa	(a)badessa	affectare	affettare
abbattĕre	abbattere	affŏras	affuori
abĕllāna	avellana	aggravāre	aggravare
abhorescĕre	abhorire	agūlia	aguglia
abŏcŭlis	avocolo	alabastrum	alabastro
abortare	aortare	albărus	albero
abstergĕre	astergere	albūmen	albume
abŭla	avolo	alicūnus	alcuno
accadēre	accadere	allactare	allattare
accīngĕre	accingere	allūmĭnare	alluminare
acĕre	acero	altĭtia	altezza
acētum	aceto	amarĭcare	amaricare
acquīsĭtare	aquistare	amatōre	amatore
acūtĭare	aguzzare	ambulare	ambiare
adaptus	adatto	amīcus	amico
addōnāre	addonare	ampŭlla	ampolla
adjacĕre	aggiacere	ancĭlla	ancella
admŏnĕstāre	ammonestare	ancŏra	ancora
ad pressum	appresso	anĕllus	anello
advĕnīre	avvenire	angĕlus	angelo
aequalis	iguale	anguīlla	anguilla

Latin	Italian	Latin	Italian
angŭstia	angoscia	astūtus	astuto
annĕctĕre	annettere	atrĭplice	atrepice
anquīna	anchini	audīre	udire
antēnna	antenna	augustus	agosto
apĕrīre	aprire	auridiare	oreggiare
appactum	appatto	avărus	avaro
apparēre	apparere	avēna	avena
appŏdiare	appoggiare	avŭlus	avolo
aprĭlis	aprile	baccalaris	baccalaro
acquarium	acquaio	baccĕllu	baccello
aranĕa	aragna	bacŭlum	bacchio
arborētum	alboreto	bacŭla	bagola
arcuballĭsta	arcobalestra	bajŭla	baila
ardōre	ardore	bajŭlus	bailo
argentarius	argentaio	ballare	ballare
argentum	argento	ballĭsta	ballestra
armarium	armario	balsămum	balsimo
aromatĭcus	aromatico	barbatus	barbato
arripāre	arrivare	barbitium	barbigi
artĭcŭlus	artiglio	barbŭlus	barbio
asărum	asero	basire	basire
ascalonia	scalogno	batillum	badile
asĭnus	asino	battuacŭlum	batacchio
asparăgus	sparago	baucālis	boccale
assaltus	assalto	betŭlla	bidollo
assĕcurare	assicurare	bicongius	bigoncio
assicĕlla	assicella	bicornia	bigornia

Latin	Italian	Latin	Italian
bifurcus	biforco	caballĭcāre	cavalcare
bilancia	bilancia	caballus	cavallo
bīrotium	biroccio	cadūcus	caluco
bĭsaccium	bisaccia	caelēstis	cilestro
biscŏctum	biscolto	caementum	cimento
bitūmen	bitume	calamellus	caramella
blandire	blandire	calcare	calcare
blattŭla	piattola	caldāria	caldaia
bolētus	boleto	calūra	calura
bŏnītas	bontà	camella	gamella
botēllum	budello	camĕra	camera
botĭna	borni	camīnus	camino
bovīnus	bovino	campāna	campana
brachiale	bracciale	cambărus	cambero
bubălus	bufalo	canăba	canova
bubŭlare	bubbolare	candela	candela
buccāta	boccata	canīle	canile
bŭcĕlla	bucella	canīnus	canino
buccĕllātum	buccellato	cannăbis	cannapa
bŭccŭla	borchia	cannamĕllis	cannamele
bŭcŭlus	bucchio	cantharella	canterella
bufōne	bufone	cantĭcum	cantico
bullicāre	bullicare	capillatūra	capellatura
burīccus	bricco	capĭstrum	capestro
burŭla	burla	capitānus	cattano
bottĭcŭla	bottiglia	capĭtellum	cattella
caballa	cavalla	capĭtŭlum	capecchio

Latin	Italian	Latin	Italian
cappella	cappella	cĭngŭla	cinghia
caprifīcus	caprifico	circŭlare	cerchiare
capŭlum	cappio	cisterna	cisterna
carbŭncŭlus	carbonchio	cithĕra	cetera
cardellus	cardello	cīvitas	città
carĭcia	carezza	clavellus	chiavello
carnālis	carnale	clavicŭla	cavicchia
carpīnus	carpino	clérĭca	chierica
casālis	casale	coacŭla	quaglia
casícāre	cascare	coagŭlum	caglio
catafalcum	catafalco	cognatus	cognato
catalectus	cataletto	cōgnítus	conto
catŭlus	cacchio	collibertus	culverto
caudĭca	cocca	colostrum	colostro
colĭcŭlus	colecchio	colŭcŭla	conocchia
centenarium	centinaio	columbus	colombo
cepŭlla	cipolla	comboros	ingombrare
cerĕbellum	cervello	commĭssūra	commessura
cernĭcŭlum	cernecchio	conchŭla	concola
cerretānus	cerretano	confidare	confidare
cicāda	cicala	conjungĕre	congiungere
cicercŭla	cicerchia	conquīrĕre	conquidere
cicindēla	cicindello	conspectus	cospetto
ciconia	cicogna	constipatus	costipato
cīmĭce	cimice	contrata	contrada
cīmŭssa	cimossa	convenium	convegno
cinctura	cintura	coopĕrcŭlum	coperchio

Latin	Italian	Latin	Italian
cooperīmentum	coprimento	dardǎnus	dardano
coopěrīre	coprire	dēbǐlis	debile
cǒphǐnus	cofano	debǐta	detta
copŭla	coppia	dĕcǐbǐlis	dicevole
coquīna	cucina	dĕcǐma	decima
coracīnus	coracino	declīnāre	dichinare
cordŏlium	cordoglio	decŏllare	dicollare
cornūtus	cornuto	dēéxcǐtāre	destare
corredare	corredare	dē̆falcare	diffalcare
corruptum	corrotto	dē̆fēsum	difesa
costātum	costato	dē̆fŏris	difuori
ciŭtŭlus	ciotola	dē̆lěctāre	dilettare
cratīcŭla	gratiglia	dē̆līmāre	dilimare
crepǐtāre	crettare	demē̆ntāre	dimentare
crībĕllum	crivello	dentǐce	dentice
crǐstatus	crestato	dē̆rēnare	direnare
crústōsus	crostoso	dĕsignare	disegnare
cŭbīle	covile	dē̆věntare	diventare
cūcŭlus	cucco	dǐgĭtāle	ditale
cūltĕllus	coltello	dīlǔvium	diluvio
cunicŭlus	coniglio	diversus	diverso
cūpŭla	cupola	divertire	divertire
cŭrculio	gorgoglio	domestǐcus	domestico
cursorius	corsoio	dominedeus	domineddio
cŭtǐna	cotenna	dormicŭlāre	dormicchiare
cotōneum	cotogno	dubǐtāre	dottare
dalmatǐca	dalmatica	dūcenti	dugento

Latin	Italian	Latin	Italian
duōdĕcim	dodici	fēnīle	finile
duracīnus	duracine	fēnŭcŭlum	finocchio
dŏmǐna	donna	fĕrramentum	ferramenta
ébĕnus	ebano	ferŭla	ferla
ĕbŭlum	ebbio	fervĕre	fervere
encaeniāre	incignare	festūca	festuca
erǐca	erica	fībŭla	fibbia
erǐcŭla	grecchia	fǐdēlis	fedele
erūca	ruca	filatūra	filatura
erǐcius	riccio	fǐlǐce	felce
evanescĕre	svanire	filiaster	figliastro
exagium	saggio	físsūra	fessura
fabĕllare	favellare	fistŭlāre	fischiare
fabrǐca	fabbrica	flammŭla	fiammola
facella	facella	floccosus	fioccoso
factiōne	fazzone	focācea	focaccia
factŏrǐum	fattoio	foliatus	fogliato
factūra	fattura	fontāna	fontana
falcōne	falcone	forāmen	forame
fallǐta	falta	forastǐcus	forastico
familǐa	famiglia	forfǐce	forfice
farīna	farina	fortūna	fortuna
farīnéus	ferigno	fractūra	frattura
fascīna	fascina	fragŭla	fragola
fatiga	fatiga	frǐcamĕntum	fregamento
fēmǐna	femmina	frondōsus	frondoso
fěnĕstra	finestra	frontāle	frontale

Latin	Italian	Latin	Italian
fūgĭta	futa	hastīle	astile
fŭllōne	follone	hĕdĕra	edera
fŭrcĭlla	forcella	hĕrbōsus	erboso
fŭrŭncŭlus	foroncolo	hĭrpĭce	erpice
fūstĭcĕllus	fuscello	horrōre	orrore
gallīna	gallina	hŏspĭte	ospite
gangraena	cancrena	hūmĭdus	umido
gemellus	gemello	hŭmĭlis	umile
genĭtus	gemito	idiotĭcus	zotico
gentiana	genziana	ilĭcetum	lecceto
genŭcŭlum	ginocchio	ĭmāgĭnātus	maniato
gerŭlus	gerla	imbracare	imbraccare
gingīva	gingiva	imbrĭceus	breccia
blandarĭus	ghiandaia	ĭmbūtum	imbuto
glandŭla	ghiandola	impactiare	impazzare
glŭtŭmia	ghiottornia	imparare	imparare
gramĭneus	gramigna	ĭmpĕtus	empito
gramŭla	gramola	ĭnante	inante
granarium	granaio	inciscŭlare	cischiare
grŭmŭlus	gromolo	incontra	incontro
gŭbĕrnum	governo	incūde	incude
gŭlōsus	goloso	indĭce	endice
gŭrgŭlia	gorgozza	indūtiae	indugia
habĭtus	abito	inĕscāre	inescare
haeretĭcus	eretico	infĭrmus	infermo
halĭce	alice	infŭltus	fulto
harpagōne	arpagone	ingĕnium	ingegno

Latin	Italian	Latin	Italian
ĭnguĭne	inguine	lanōsus	lanoso
inocŭlare	inocchiare	laqueolus	lacciuolo
insomnium	insogno	larĭce	larice
instrŭmĕntum	stromento	latīnus	latino
intermĕdium	intermezzo	latratus	latrato
intervallum	intervallo	lavatorium	lavatoio
intéxĕre	intessere	lectīca	lettiga
intúnĭcare	intonaccare	lectĭōne	lezione
invĭtāre	invitare	legālis	legale
irātus	irato	legĕnda	lienda
jacīle	giaciglio	lĕntīcŭla	lenticchia
jocŭláre	gioculare	leōne	lione
jūdaeus	giudio	lepórārĭum	leporaio
jūdĭce	giudice	lĕpórārius	lepraio
jumĕntum	giumento	lĕvĭtum	lievito
junctūra	giuntura	licīnium	lezzino
juramĕntum	giuramento	lĭgamĕntum	ligamento
jŭvencus	giovenco	lĭgatūra	legatura
labīna	lavina	lĭgnāmen	legname
lacerta	lucerta	līmāceus	lumaccia
lacrĭma	lagrima	līmōsus	limoso
lactūca	lattuga	lĭnteŏlum	lenzuolo
lacūna	laguna	lĭttĕra	lettera
laetamen	letame	logĭcus	loico
lamĭne	lamina	lūcarīnus	lucherino
lampăda	lampada	lucerna	lucerna
lamprēda	lampreda	lūcōre	lucore

Latin	Italian	Latin	Italian
lŭmbrĭcus	lombrico	marītus	marito
lūnŭla	lulla	marrŭbium	marrobbio
lŭpīnus	lupino	martellum	martello
lŭpŭlus	luppolo	mascŭlus	maschio
lūrĭdatus	lurdare	mastĭce	mastice
lŭscĭniŏlus	lusignuolo	matăris	mattero
lŭtōsu	lotoso	matrĭgna	matrigna
macĕllarius	macellaio	mattĕola	mazzuola
macĕllum	macello	matutīnum	mattino
machina	macina	maxĭmus	massimo
machĭna	macchina	medĭcus	medico
macúla	macchia	memŏrāre	membrare
macúlāre	macchiare	mendicĭtāte	mendicità
maenúla	menola	mēsūra	misura
majālis	maiale	mentastrum	mentastro
majōre	maggiore	mentītōre	mentitore
malĭfatius	malvaggio	mercatus	mercato
mamĭlla	mammella	merúla	merla
mandragŏras	mandragola	micīna	miccino
manianus	magnano	micŭlīna	miccolina
manĭbella	manovella	milliārium	migliaio
manĭca	manica	mĭnăcia	minaccia
manúpŭlus	mannocchio	mĭnĭmus	menomo
mantaica	manteca	mĭnūtus	minuto
mantēllum	mantello	mīrabĭlia	meraviglia
mantīca	mantaco	mĭracŭlum	miracolo
margarīta	margherita	mĭxtīcius	mestizzo

Latin	Italian	Latin	Italian
mŏlīnārius	mulinaio	nĭgĕlla	nigella
mŏllĭca	mollica	nĭgrĭtia	negrezza
mŏnastĕrium	monastero	nĭvōsus	nevoso
mŏntānus	montano	nŏtarius	notaio
mōrĕllus	morello	nūbĭlus	nuvola
mortālis	mortale	oboedire	ubbidire
mŏvĭta	motta	obscurus	scuro
mŭcĭdus	mucido	obsĭdium	assedio
mŭndĭtia	mundezza	ŏccĭdĕre	uccidere
mŭrēna	morena	offĭcīna	fucina
mŭscŭlus	muschio	ŏpăcus	opaco
mŭstōsus	mostoso	ŏpĕra	opera
mŭtĭlione	modiglione	ōrdĭnium	ordigno
mutŭlus	mucchio	ordĭne	ordine
myrtella	mortella	ovīle	ovile
myrtīnus	mortina	paeonia	peonia
nakĕra	nacchera	palāra	palaia
narīcae	narice	palatium	palazzo
nasūtus	nasuto	păllĭdus	pallido
natālis	natale	palpĕbra	pelpebra
natĭca	natica	pampĭnus	pampino
navĭcēlla	navicella	pannĕllus	pannello
nēbŭla	nebbia	panthĕra	pantera
nĕcĕssĭtāte	nicistà	paradīsus	paradiso
nĕpōte	nipote	parĕnte	parenti
nibŭlus	nibbio	parĭcŭlus	parecchio
nidōre	nidore	parrĭcus	parco

Latin	Italian	Latin	Italian
pastĕllum	pastello	planĭtia	planezza
patĕlla	padella	plūmacium	piumaccio
paupĕro	povero	podiúlum	poggiuolo
pavĭmĕntum	pavimento	pŏllīre	pollire
péccātum	peccato	pollĭce	pollice
pĕdāle	pedale	pŏrcarius	porcaio
pedícĕllus	pedicello	portatōre	portatore
pĕdūlis	pedule	postcinium	pusigno
pĕndŭlus	pendolo	posula	posola
penícúlus	pennecchio	praebenda	prebenda
pĕpōne	popone	prĕhensiōne	prigione
pĕrĕgrīnus	pellegrino	princĭpe	principe
perniōre	perniore	protúndus	protondo
pertica	pertica	pūblĭcus	puvico
pĭctōre	pittore	pūgnāle	pugnale
pĭctūra	pittura	púllĭcēnus	pulcino
pīcúlus	picchio	pŭlmōne	pulmone
pĭlāmen	pelame	púlviscŭlus	polvischio
pílōsus	peloso	pŭngĕllus	pungello
pīlúla	pilola	púrpúra	purpora
pĭnnacúlum	pennachio	quadiatus	quadiato
pinniōne	pignone	quatĕrnus	quaderno
pĭscarius	pescaia	quīndĕcim	quindici
pĭsellum	pisello	quirĭtāre	gridare
pĭstrīnus	pistrino	rabiosus	rabbioso
pipīta	pipita	radiŏlus	razzuolo
placíbĭlus	placevole	radĭce	radice

Latin	Italian	Latin	Italian
ragŭ́lắre	ragliare	rĕ́trŏ́rsus	ritroso
ramentum	ramento	rĕvī́sítare	rovistare
ramōsus	ramoso	rĕ́vŏ́lūtāre	rivoltare
ramŭ́scĕ́llum	ramoscello	rīmáre	rumare
ranŭ́cŭ́la	ranocchia	rĭngŭ́lare	ringhiare
rapídus	rapido	rívŭ́lus	rivolo
rasorium	rasoio	rŏ́bŏ́retum	rovereto
rasūra	rasura	rōbŏ́re	rovere
rĕ́capítāre	ricapitare	rōmāna	romano
recadēre	ricadere	rosmarínum	ramerino
regiōne	rione	rŏtêlla	rotella
rĕ́mŏlum	remolo	rŏtĭcīnus	roticino
rĕ́mŭlcŭ́m	rimorchio	rŏtŭlus	rocchio
reniōne	rognone	rŏtŭ́ndus	ritondo
receptāre	ricettare	rŭ́bĕ́tum	roveto
recŏ́cĕ́re	ricuocere	rŭīna	rovina
rĕfrangĕ́re	rifrangere	rŭ́míce	rom(b)ice
rĕfūtāre	rifutare	rŭ́mōre	rumore
rĕ́gūlāre	regolare	rŭncīnus	ronzino
rĕlĕ́gāre	rilegare	rūscŭ́lum	ruschio
rĕmŭndāre	rimundare	rūstícus	rustico
rĕpausāre	riposare	sabbătum	sabato
rĕsĕcāre	risecare	sabŭ́lōne	sabbione
rĕspŏ́ndĕre	rispondere	saetacium	staccio
rētíncīna	ritrecine	saggĭta	saetta
rĕ́tína	redine	salícastrum	salicastro
rĕ́tŏ́rtus	retorta	salīva	saliva

Latin	Italian	Latin	Italian
salūte	salute	sĭggĭllare	suggellare
sanctĭtāte	santità	sīlĭcŭla	salecchia
sanguinĕus	sanguigno	sincērus	sincero
sapĭdus	sapido	sĭnĭster	sinestro
sarcīna	sarcina	sĭtŭla	secchia
sartōre	sartore	smargadus	smeraldo
scabellum	sgabello	socĭetāta	società
scarpellum	scarpello	solarium	solaio
scarlatum	scarlatto	sŏlĭdus	sodo
schedŭla	cedola	sórdĭtia	sordezza
schŏlāris	scolare	sŏrŏrcŭla	sirocchia
scoffina	scuffina	spatŭla	spatola
scopilia	scoviglia	spēcŭlum	specchio
scorpiōne	scorpione	spélunca	spilonca
scrīptūra	scrittura	spīcŭlum	spigolo
scútélla	scotella	spīnŭla	spilla
sēcăle	segola	spīrĭtus	spirito
sécúndum	secondo	spŏrtella	sportella
sellarius	sellaio	spūmōsus	spumoso
sēmĕntia	semenza	squamōsus	squamoso
sĕniōre	signore	stamĭneus	stamigna
sĕntōre	sentore	sternūtāre	starnutare
sĕrmōne	sermone	stĕrnūtus	sternuto
sĕrpente	serpente	stĭpŭla	stoppia
sĕrvītium	servizio	stĭrpētum	sterpeto
sĭccaneus	seccagna	stŏlōne	stolone
sĭccatōrius	seccatoio	stramentum	stramento

Latin	Italian	Latin	Italian
strĭctūra	strettura	tĕpĭdus	tepido
sōbĕr	sughero	tĕrĕbĕllus	trivello
sūcōsus	sugoso	tĕrrāneus	terragno
sūcŭlāre	succhiare	terrĭtōrium	territorio
sūcŭlus	succhio	tĕstaceum	testaccio
sūdōre	sudore	tĭmōre	timore
sŭffrăcta	soffratta	tĭneóla	tignuola
sŭpéranus	soprano	tītĭllus	ditello
sŭpercŭlus	soperchio	tītúlus	titolo
sŭppĕdaeneus	soppidiano	tŏrcŭlum	torchio
sūrcŭlus	sorcolo	tŏrmĕntum	tormento
sūsīna	susino	torpēdĭne	torpedine
tābănus	tafano	tortorium	tortoio
tabĕlla	tavella	tŏxĭcum	tosco
tabernarius	tavernaio	tradĭtiōne	tradigione
tabŭlātum	tavolato	tradŭce	tralce
talĕntum	talento	trajectus	tragetto
talōne	talone	travĕrsa	traversa
tamarīce	tamerice	trēdĕcim	tredici
tapētum	tapeto	trēmacŭlum	tramaglio
tardīvus	tardivo	termŭlus	tremolo
tégŭla	tegghia	trĭbŭlāre	tribbiare
tĕmōne	timone	trībŭlum	tribbio
tenāce	tenace	trĭfŏlium	trifoglio
tenerĭtia	tenerezza	trīstĭtia	tristezza
ténōre	tinore	tŭmŭlus	tomolo
tĕntiōne	tenzone	tūnĭca	tunaca

Latin	Italian	Latin	Italian
tŭrbĭdus	turbido	variŏla	vaiuolo
turdēla	turdela	varĭce	varice
tŭrtŭre	tortora	vascĕllum	vascello
tŭrtŭrĕlla	tortorella	vascŭlum	vascolo
ŭlmētum	olmeto	vectūra	vettura
ŭlpĭcŭlum	upiglio	vĕndĭtōre	venditore
ŭlŭccus	allocco	venēnum	veleno
urŭlāre	urlare	vĕntĭlabrum	ventolaio
ŭmbracŭlum	ombracolo	ventōsa	ventosa
ŭmbrĕlla	umbrello	vĕrbēna	vermena
ŭncīnātus	uncinato	verbēnāca	verminaca
ŭncīnus	uncino	verōnĭce	vernice
ŭndatus	undato	verūca	verruca
ŭndosus	ondoso	vĕrtīgĭne	vertigine
ŭnĭvĕrsus	universo	vĕsper	vespero
ŭrceŏlus	orsivolo	vĕssĭca	vescica
ŭrtīca	urtica	vestĭmĕntum	vestimento
ustrĭnāre	strinare	vĭcāta	vicata
ūsūra	usura	vĭcĕnda	vicenda
ŭtĕllum	utello	vicŭlus	vicolo
ūvŭla	ugola	vilĭtāte	viltà
vaccīna	vaccina	vincĭlia	vinciglio
vagabūndus	vagabondo	vĭndĭcta	vendetta
vanĭtāte	vanità	vĭrgātus	vergato
vapōre	vampore	vĭrtūte	vertù
vapŭlo	vapolo	vĭtĕllus	vitello
varĭcāre	varcare	vĭtĭcula	viticchio

Latin	Italian	Latin	Italian
vĭtrorium	vetraia	volvŭlus	volgolo
vĭtŭlus	vecchio	zabĕrna	giberna
vĭvŭla	vivole	zelōsus	geloso
volatĭcus	volatico		

Latin-Spanish

Latin	Spanish	Latin	Spanish
abăcus	âbaco	affŏras	afuera
abĕllāna	avellana	agnīnus	añino
abismus	abismo	agulia	aguja
abrŏtŏnum	brótane	alabastrum	alabastro
absurdus	zurdo	albāris	albar
accĕia	arcea	albūra	albura
accēdia	acidia	alĭcūnus	alguno
acĕre	arce	altănus	áltano
aciarium	acero	allumĭnāre	alumbrar
acrōre	agrur	altĭtia	alteza
acŭleātus	aguijada	amarĭcus	amargo
addūcēre	aducir	amatōre	amador
adīrāre	airar	amistate	amistad
armordium	almuerzo	amīcus	amigo
adŏcŭlāre	aojar	ampŭlla	ampolla
ad retro	arredro	anatīcŭla	nabaja
ad versus	aviesos	anĕllus	anillo
aequālis	igual	angŭstus	angosto
aestīvus	estío	annicŭlus	añejo
affĕctus	afecho		

Latin	Spanish	Latin	Spanish
antĕannum	antaño	bagassa	bagasa
apăge	aba	baccalāris	bachiller
apertūra	abertura	baccīnum	bacín
apŏstŏlus	apóstol	bajŭlus	baile
aparescĕre	aparecer	ballĭsta	ballesta
appostīciŭs	postizo	balneatōre	bañador
aprīlis	abril	balsămum	bálsamo
aquārium	agueiro	baptīsmus	bautismo
aranĕa	araña	barbātus	barbado
arbŭtus	álborto	batĭllum	badil
ardītus	ardite	battuacŭlum	badajo
arēna	arena	battualia	batalla
arĭdus	árido	batŭlus	balde
armatūra	armadura	baucālis	bocal
arrŭgia	arroyo	benedictus	bendito
artĕmĭsia	altamiza	benīgnus	benigno
artĭcŭlus	artejo	berŭla	berro
asĭnus	asno	beryllus	vericle
astĕlla	astilla	besticŭlum	vestiglo
astrōsus	astroso	bĭbĭtōre	bebedor
auditus	oído	bicornia	bigornia
augŭrium	agüero	bifĕrus	breva
augŭstus	agosto	bifĭdus	befo
aurifĭce	orezbe	bĭlĭsa	belesa
autŭmnus	otoño	biregeta	vericueto
avēna	avena	bisaccium	bezazas
aviŏlus	abuelo	biscoctum	bizcocho

Latin	Spanish	Latin	Spanish
bĭtūmen	betún	camella	gamella
bŏnĭtāte	bondad	camĕra	cámara
brachiāle	brazal	camerarius	camarero
būccŭla	bucle	cammărus	gámbaro
bucīna	buzón	cammīnus	camino
bulgarōne	bugarrón	camūce	gamuza
bordōne	bordonero	campana	campana
burrāgo	borraja	campecĕllus	campesillo
būrŭla	burla	campestris	campestre
bŭrrīcus	borrico	canăle	canal
bŭttĭcŭla	botella	cancellarius	cancellar
caballa	caballa	candela	candela
caballus	caballus	canīnus	canino
caccăbus	cacho	canitia	caneza
cadāver	calabre	cannăbis	cáñamo
caemĕntum	cimiento	cannamellis	cañamiel
caesĕllum	cincel	canĕlla	canilla
cespĭte	césped	canthărus	cántaro
calămus	calmo	cantĭcum	cántiga
calcaneum	calcaño	capanna	cabaña
calceatus	calzado	capĭllus	cabello
calligo	calina	capitānus	capitán
calŭmnia	caloña	capĭtium	cabeza
calūra	calura	cappella	capella
calavaria	calavera	caprūnus	cabruno
camabaeus	camafeo	capŭlum	cable
cambīta	camba	carābus	caraba

Latin	Spanish	Latin	Spanish
caracŭlum	carajo	cepŭlla	cebolla
carbōne	carbón	cereola	ciruela
carcĕre	cárcel	cernĭcŭlum	cerneja
cardĕnus	cárdeno	cervīce	cerviz
cardōne	cardón	cervīnus	cervuno
carĭcia	careza	chirugia	sirujia
carīna	carena	cicada	cigarra
carĭstia	carestia	ciconia	cigüeña
carnacius	carnaza	cimĭce	zisme
carnarium	carnero	cintūra	cintura
carrasca	carrasca	cingŭla	cincha
carvalya	carvajo	circĕllus	zarcillo
casālis	casal	cĭrcŭlāre	cerchar
casarius	casero	cithĕra	cítara
casearia	quesera	civĭtāte	ciudad
casĕlla	casilla	clavellus	clavel
castanea	castaña	clavicŭla	clavija
castĕllum	castillo	coacŭla	coalla
castitate	castidad	coctūra	cochura
catafalcum	catabalco	codĭce	código
catalanus	catalán	coemeterium	cimenterio
catellus	cadillo	cognatus	cuñado
catēna	cadena	cogitatus	cuidado
cellariarius	cillerero	colăphus	colpo
cellarium	cillero	coleone	cojón
centenum	centeno	collacteus	collazo
centipede	cienpies	collecta	cosecha

Latin	Spanish	Latin	Spanish
collibertus	culber	cordolium	cordojo
collīna	colina	coriamen	corambre
colōre	color	cornĭcŭla	corneja
colostrum	calostro	cŏrnūtus	cornudo
colobra	culebra	corōna	corona
colŭmellus	colmello	coronisa	cornisa
comĭte	conde	corticea	corteza
comestiōne	comestón	cortīna	cortina
commīssum	comiso	costatum	costado
communĭcāre	comulgar	cotŭrnīce	cordorniz
compania	compaña	creatūra	[illegible]iatura
compŏsĭtus	compuesto	credencia	creencia
cómpŭtus	cuento	crepatūra	quebřadura
conchŭla	concha	carbĕllum	grabillo
cóncŭba	quéncuba	crudēlis	cruel
consĭlium	consejo	crŭstōsus	crostoso
consŏcer	consuegro	cŭbicŭlum	cobija
consŏlĭda	consuelda	cucūlla	cogulla
consútūra	costura	cŭculliata	cogujada
contentiōne	contensión	cúcŭllus	cogollo
contractus	contrecho	cūcŭlus	cuquillo
contrata	contrada	cŭlcīta	colœdra
convenium	convenio	cultĕllus	cuchillo
cŏphĭnus	cuévano	cŭnĭcŭlus	conejo
copŭla	copla	cupélla	cubillo
coquīna	cocina	cŭrcŭliōne	gorgojo
corbita	corbeta	cŭscŭllium	coscojo

Latin	Spanish	Latin	Spanish
cŭtīna	codena	focacea	fogaza
dacŭlum	dalle	foetibŭndus	hediondo
dēbĭlis	débil	follĭcāre	holgar
dēbĭta	deuda	foramĭne	horambre
debĭtōre	deudor	formaceus	hormazo
decĭma	delma	fortūna	fortuna
delĭcātus	delgado	fricamentum	fregamento
denarius	dinero	frictura	fritura
derotatus	denodado	frondōsus	frondoso
dentāle	dental	frontāle	frontal
dentatus	dentudo	fundamentum	fundamento
diabŭlus	diablo	furcilla	horcilla
dĭgĭtus	dedo	gabŭlum	gable
dominĭcus	domingo	ballĭcus	galgo
dūbĭta	duda	garrŭlāre	garlar
ebriacus	embriago	gemellĭcus	emelgo
elemosna	limosna	genĕsta	hiniestra
fabŭlāre	hablar	genŭcŭlum	hinojo
facŭla	faja	glandŭla	landre
fallĭta	falta	globĕllus	ovillo
februarius	febrero	grammatĭca	grámatica
fenŭcŭlum	hinojo	habitacŭlum	bitácora
feramĕntum	herramienta	habĭtus	hâbito
filacia	hilacho	hastīle	astil
filatum	hilador	hĕdĕra	hiedra
filiaster	hijastro	hemicrania	migraña
flĕbĭlis	feble	hĕrbōsus	herboso

Latin	Spanish	Latin	Spanish
heredítāre	heredar	intybus	envidia
hibĕrnus	invierno	intonce	entonces
hinnitŭlāre	relinchar	inversum	inveso
hocanno	ogaño	invītus	amidos
homicidium	mohecillo	ironia	ronia
honōre	honor	januarius	enero
horologium	reloj	jejūna	ayuno
horrōre	horror	jocalia	chocallacho
hŏspĭte	huésped	judaes	judío
humidĭtāte	humedad	jumentum	jumento
humīlis	humilde	juramentum	juramento
hūtĭca	hucha	junctūra	juntura
ilĭce	ilce	lebrĕllum	lebrillo
imagĭne	imagen	labrusca	labrusca
imbrēce	embrice	lacertus	lagarto
ĭncŭbus	éncobo	lacrĭma	lágrima
indĭcum	índigo	lactūca	lechuga
infante	infante	lacūna	laguna
infĕrnum	infierno	lancearius	lancero
infĕstus	infiesto	lanōsus	lanoso
ingenium	engeño	lappaceum	lapaza
ĭnĭmīcus	enemigo	larĭdum	lardo
insania	saña	latrōne	ladrón
insĭgnia	enseña	latrosinium	ladrocinio
insŏmnium	ensueño	laudatōr	loador
intĕger	enterco	latīnos	latino
intestina	estentina	lavatorium	lavadero

Latin	Spanish	Latin	Spanish
legālis	leal	luparius	loberó
legūmĭne	legumbre	luscinĭdus	rosignol
lĕndĭne	liendre	machĭna	máquina
lentĭcŭla	lenteja	macŭla	malla
leprōsus	leproso	madōre	mador
lĕpŏre	liebre	majōre	mayor
levarius	ligero	malífatus	malvado
levĭtum	levdo	malīgnus	malina
libélla	nivel	malleŏlus	majuelo
lĭcinium	lechino	mamĭlla	mamella
lĭgnamen	leñame	manciola	manzuelo
lĭgnarius	leñero	mancípium	mancebo
limaceus	limaza	manĭca	manga
limĭte	linde	manicŭla	manija
liminaris	limnar	manícus	mango
limōsus	limoso	manúpúlus	manojo
limpĭdus	limpio	mantaica	manteca
lin[illegible]ola	linura	mantēle	mantel
lĭnteolum	lenzuelo	mantĕllum	manteo
lĭttĕra	letra	manuālis	manual
lĭxivum	legia	manuaris	manera
lŏcālis	lugar	manuopera	manobra
locĕllus	lucillo	marcŭlus	macho
lucerna	lucerna	margarita	margarita
lumbrīcŭla	lambrija	maritĭmus	marisma
lumbrīcus	lombriz	martĕllum	martillo
lūmĭne	lumbre	mascŭlus	macho

Latin	Spanish	Latin	Spanish
matexa	mateja	mĭnacia	menaza
materia	madera	mĭnĭmāre	mermar
matrastra	madrastra	ministrium	mester
matrĭsĭlva	madreselva	mĭnutia	menuza
matrīce	madriz	mĭnūtus	menudo
mattianum	manzana	miracúlum	milagro
matūrus	maduro	mĭscŭlāre	mezclare
maxilla	mejilla	miscellus	miesiello
maxĭmum	májimo	mĭxticius	mestizo
medietate	mitad	mixtūra	mistura
medŭlla	meolla	modŭlus	molde
melancolia	malenconia	molestia	molestia
melĭmetum	membrillo	molinarius	molinero
memŏrāre	lembrar	molīnum	molino
mendīcus	mendigo	mollĭtia	molleza
mesūra	mesura	monēta	moneda
mercatōre	mercador	montanea	montaña
mercātus	mercado	montensis	montes
mercēde	merced	monticello	monticello
merĕnda	merienda	monumentum	monumento
mĕrŭla	mierla	mŭrdacia	mordaza
mespĭtus	míspolo	mŏrdĭcus	muerdijo
metípŏnus	mimo	morellus	morella
metĭtōre	medidor	mortālis	mortal
metŭla	meja	mortalĭtāte	mortaldad
milimindrus	milmandro	mucrōne	mugrón
millarium	mijero	mutrōne	muflón

Latin	Spanish	Latin	Spanish
muscŭlus	muslo	absidium	osedio
mustīdus	mustio	octavos	ochavo
mŭtiliōne	modillón	octūber	octubre
nasturcium	mastuerzo	ocŭlāta	oblada
natatōre	nadador	ŏcŭlu	ojo
natĭca	nalga	olīva	oliva
natĭvĭtāte	navidad	olīvus	olivo
navĭcella	nacella	onocrotólus	ocroto
navigium	navío	opéra	obra
nĕbúla	niebla	operarius	obrero
negotium	negocio	opiniōne	opinión
nigellus	niel	ordĭne	orden
nĭtĭdus	neto	orgănum	órgano
nĭvaria	nevera	orĭgănum	orégano
nĭvōsus	nevoso	ŏrphănus	huérfano
nŏdĕllus	nudillo	orŭlāre	orlar
nodōsus	nudoso	ovĭcŭla	oveja
nomĭne	nombre	pagensis	país
nomĭnāre	nombrar	palatium	palacio
novāle	noval	pallĭdus	pálido
novĕmber	noviembre	palŭmbīnus	palomino
novicius	novicio	palŭmbus	palomo
nubĭlus	nublo	pampĭnus	pámpano
nucālis	nogal	panaricium	panadizo
nucetum	nocedo	panarium	panero
obscurítāte	escuridad	pantĭce	panza
obscūrus	oscuro	panŭcŭla	panoja

Latin	Spanish	Latin	Spanish
parabŏla	palabra	pĭscatōre	pescador
paradīsus	paraíso	placĭtum	pleito
paratella	paradella	plancŏla	lancha
parcellus	parcello	pluviōsus	lluvioso
parentatus	parentado	polĕnta	pulienta
parĭcŭla	pareja	pŏpŭlus	pueblo
parŏchus	párroco	pŏrcarius	purquero
parrĭcus	parque	porcellus	porcel
partecĕlla	partecilla	portarius	portero
pastūra	pastura	postīcius	postiz
patĕlla	padilla	podĕstāte	podestad
patrastĕr	padrastro	potiōne	pozón
patrīnus	padrino	practĭca	plática
pauperĭtāte	pobredad	praeposĭtus	preboste
pavĭmĕntum	pavimiento	presēpe	pesebre
peccatum	pecado	primicarius	primicero
pedaneus	peaña	princĭpe	príncipe
pedĭcus	piezgo	probamĕntum	probamiento
pĕlăgus	piélago	privātus	prīvado
pelliceus	pebliza	profūndus	profundo
perfectus	perfecto	proxĭmus	prójimo
pericŭlum	peligro	pugnāle	puñal
persona	persona	pŭllĭtiōne	pollazón
pĕrtĭcus	piértica	pullĭtru	poltro
pictūra	pintura	pŏlmōne	pulmón
pĭgrĭtia	pereza	pŏlpōsus	pulposo
pĭnnacŭlum	penacho	pŭrĭtāte	poredad

Latin	Spanish	Latin	Spanish
purpŭra	púrpula	regĕsta	registro
pŭstĕlla	postilla	regīna	reina
pŭtatōre	podador	regŭla	regla
pŭtatoria	podadera	remŭlcum	remolque
pŭtearius	potero	renĭcus	renco
pŭtōne	podón	reniōne	riñón
quadratus	cuadrado	respectus	respeto
quassĭcāre	cascar	restŭcŭlum	restojo
quaternus	cuaderno	retĭnacŭlum	rendape
quindĕcim	quince	letrorsus	redoso
q̄uimŏdo	cuerno	robīne	robín
rabiosus	rabioso	robŏretum	robledo
racēmus	racimo	robustus	robusto
radĭcālis	raigal	romana	romana
radīce	raíz	romanĭce	romance
ramōsus	ramoso	rotĕlla	rodilla
rancĭdus	rancío	rotŭlus	rollo
rancōre	rangor	retondus	redondo
rapāce	rabaz	rubīnus	rubí
rapĭdus	rauda	ruina	ruina
rasĭcāre	rascar	rumōre	rumor
rastĕllus	rastillo	rŭptura	rotura
rasūra	rasura	rŭtabellum	rodavello
rebucĭnāre	rebuznar	sabănum	sábana
recŏctus	recocho	sabbătum	sábado
refĭndicŭla	rebendija	sabīna	sabina
regālis	real	sabūga	sabuga

Latin	Spanish	Latin	Spanish
sabŭlōne	sablón	seniore	señor
saecŭlum	siglo	septimana	semana
saetacium	sedazo	serĭca	jerga
sagĭtta	saeta	serpĕnte	serpiente
sagīna	saina	serviente	sargento
salĭcarius	salguera	sibĭlāre	silbar
salĭce	sauce	sĭccatūrus	segadero
salŭbris	salobre	sigĭllum	sello
sanctĭtāte	santidad	sĭgnāle	señal
sanguineus	sangueño	sĭngellus	sencillo
sapĭdus	sabio	sinĭster	siniestro
saracenus	saraceno	smaragdus	esmeraldo
sarcillum	sarcillo	sobrīnus	sobrino
sartōre	sastre	societātis	sociedad
scabellum	escabello	solānus	sólano
scarpellum	escarpello	sollacium	solaz
scandăla	escanda	sŏlĭdus	sueldo
schedŭla	cédula	solĭtāte	soledad
scholāris	escolar	sorĭce	sorce
scintilla	centella	sorticŭla	sortija
scopilia	escobilla	spatúla	espalda
scorpiōne	escorpión	specŭlum	espejo
scutĕlla	escudilla	spicŭlum	espligo
secūndum	según	spīnōsus	espinoso
secūrus	seguro	spirauca	espiriga
sellarius	sillero	spīrĭtu	espíritu
semĕntis	simiente	splendōre	esplendor

Latin	Spanish	Latin	Spanish
sportĕlla	esportilla	tegŭla	tecla
squalĭdus	escalio	temōne	timón
statiōne	estación	tenāce	tenaz
stabilis	etadal	tesiōne	tesón
sterĭlis	estéril	tentiōne	tenzón
sternutus	estornudo	tepĭdus	tibio
stomăchus	estómago	terebinthinus	tremeñtina
stranurria	estranurria	terraneus	terreno
strĭctus	estrecha	territorium	terrotorio
subĕlla	cubilla	terrōsus	terŕoso
subterraneus	subterráneo	tertiarius	tercero
sucĭdus	sucio	tertiolus	terzuelo
sucōsus	sucoso	talámus	tálamo
sudōre	sudor	tĭmóre	temor
sŭffictus	sofito	tinctūra	tintura
sŭpĕranus	sobrano	tineósus	tinoso
sŭpercŭlus	sobejo	titiōne	tizón
sŭpernus	soborno	tītŭlus	tilde
sŭpĕrāre	sobrar	toméntum	tomiento
sŭspectus	sospecho	tormentura	tormento
tabănus	tábano	torpedo	torpedo
tabilla	tabilla	torāce	toraz
tabernarius	tavernero	tortiōne	torozón
tabŭla	tabla	tosiōne	tusón
talentum	talanto	trabĭcŭlum	trabejo
tamarīce	tamariz	traditiōne	tración
tapetum	tapete	tradĭtōre	traidor

Latin	Spanish	Latin	Spanish
tramĭte	trámite	ŭrtīca	ortiga
transvĕrsa	traviesa	usūra	usura
transvĕrsus	travieso	vadōsus	vadoso
tredĕcim	trece	vagīna	vaina
tribŭlum	trillo	vagĭnélla	vainilla
trĭllīce	tèrliz	venabŭlum	venablo
trimensus	tremés	venatōre	venadore
trimodio	tràmoya	venatorius	venadero
tristĭtia	tristeza	venātus	venado
tritĭcum	trigo	vendĭtāre	vendar
truncŭlus	trancho	vendĭtōre	vendidor
tŭbĕllum	tobillo	venēno	veneno
tŭbŭla	tolva	veneria	venera
tŭdŭcŭlus	tollo	venōsus	venoso
tŭnĭca	tonga	ventōso	ventosa
turbĭdus	turbio	ventrisca	ventresca
tŭrbīscus	torbisco	ventríscŭla	ventrecha
turtuella	tortolilla	verānum	verano
ulĭce	urce	verbéna	verbena
ŭlmentum	olmedo	verecundia	vergüenza
ŭlŭccus	loco	vermĭcŭlus	bermejo
ŭmbilĭcus	ombligo	verrūca	verruga
unctūra	untura	versĭcus	bizco
ŭndōsos	ondoso	verŭcŭlum	berrojo
ŭngŭla	uña	verbactum	barbecho
unicornis	unicornio	vessīca	vejiga
ŭrīna	orina	vestitūra	vestidura

Latin	Spanish	Latin	Spanish
vestītus	vestido	villanus	villano
vĕtŭlus	viejo	vindemia	vendimia
viburnum	viorno	vindicta	vendecha
vicata	vegada	virgĭne	virgen
vĭcīnus	vecino	viscōsus	viscoso

Latin-Portuguese

Latin	Portuguese	Latin	Portuguese
abăcus	ábaco	acūtus	agudo
abadesa	abadesa	acutia	acuça
abbate	abade	acūmen	gume
abbatĭa	abadia	adĭtus	eido
abĕllāna	avellã	admordium	almoço
abēte	abeto	adocŭlāre	aòlhar
abigōne	abigão	ad retro	arredo
abismo	abismo	ad satis	assaz
abūsus	abuso	adversarius	adversario
acacia	acacia	advocatus	(a)vogado
acceptōre	açor	aequālis	igual
accessus	acesso	aerámen	arame
acedia	acidia	aestīvus	estío
acētum	azedo	aevĭtāte	eitate
acierium	acero	affŏra	afora
acucŭla	agulha	affrĭcus	ábrego
acularius	agulheiro	agīna	asinha
acúleatus	agulhado	agnīnus	àninho

Latin	Portuguese	Latin	Portuguese
agrimonia	aramenha	artemisia	artemista
alabastrum	alabastro	artĭcŭlus	artelho
alamanus	alamanda	asĭnarius	asneiro
alaterna	alterna	asĭnus	asno
albura	albura	aspĭde	áspide
alĭcūnus	algum	astĭlla	astella
altĭtia	alteza	astrōsus	astroso
amarĭcocus	amargoso	audentia	ouveença
amatōre	amador	auguarium	aguouro
amicĭtāte	amizade	augŭstus	agosto
ampŭllo	empolla	aurĭcŭlum	orelha
ancŏra	ancora	autŭnus	atuno
anĕllus	anillo	avēna	aveia
anĭma	alma	avisthrūsus	abestruz
annĭcŭlus	anelho	badius	baio
antēnna	antenna	ballēna	baleia
apĕrtum	aberto	balnĕatōre	banhador
apĭcŭla	abelha	balsămum	bálsamo
apposticum	postiço	bancāle	bancal
aprīlis	avril	barbūtus	barbudo
aquarium	aqueiro	barbŭtus	barvos
aranea	aranha	batualia	batalha
arbŏre	árvore	batŭlus	balde
ardōre	ardor	búcālis	bocal
arĭdus	árido	benīgnus	benigno
armenius	armenho	bestŭlus	bicho
arrŭgia	arroio	bĭbĭtus	bébado

Latin	Portuguese	Latin	Portuguese
bicarium	pichel	camĕra	cámara
bicornius	bigorna	camerarius	camareiro
bĭférus	bébera	camīnus	caminho
biscoctum	biscato	camīsia	camisa
boarius	boeiro	campania	campanha
bonĭtāte	bondade	campĭcellus	campecelo
brachiale	braçal	campestris	campestre
bufŭlcus	bifolco	cánalĭcŭla	guelha
buccŭla	broca	candēla	candeia
bŭrdōne	bordão	candelabrum	candeiro
borragĭne	borragem	canĭcŭla	caneja
burrīcus	burrico	cannamelus	caramelo
burŭla	burla	canonĭcus	cònego
bŭttĭcŭla	botelha	cantărus	cántaro
cavalla	cavalla	cantīcum	cantiga
caballĭcāre	cavalgar	cantiōne	canção
caballus	cavallo	capācium	cabaz
caeremonia	çorminha	capanna	cabana
calamellus	claramela	capĭllatim	cabell'adim
calămo	câlamo	capĭllus	cabelo
calcaneum	calcanho	capĭstrum	cabrestro
calceamentum	calçamento	capitānus	capitão
calceatus	calçado	capōne	cabão
caldaria	caldeira	capella	cabela
calăveria	caveria	capellus	capelo
camahaeus	camafeio	caprarius	cabreiro
camella	gamella	caprōne	cabrão

Latin	Portuguese	Latin	Portuguese
caprūnus	cabrum	castĭtāte	castidade
captīvus	cautivo	castōre	castor
capŭlum	cabre	casŭla	cásula
carăbus	cáravo	catafalcum	catafalco
caracŭlum	caralho	catĕllus	cadilho
carbōne	carbao	catēna	cadeia
carbonaria	carvoeira	catīnus	cadinho
carcére	cárcere	cellarius	celeiro
carcerarius	carcereiro	centenum	centeio
cardĭnus	cardeo	cepūlla	cebula
carĭcia	careço	cernícŭlum	cernélha
carīna	querena	certārus	certaro
carĭstia	carestia	cervīce	cerviz
carnacius	carnaz	cicerōne	cizirao
carnālis	carnal	cĭconia	cegonha
carnarium	carneiro	cicūla	cejuda
carnūtus	carnudo	cimĭce	chisme
caronia	carronho	cinctūra	cintura
carpentarius	carpinteiro	cingŭla	cilha
carraria	carreira	civĭtāte	cidade
carrasca	carrasca	clavĭcŭlus	chavelha
carvalya	carvalho	cloaca	colaga
casālis	çasal	coagŭlum	coalho
casarius	caseiro	cochlearĭum	colhara
cascabellus	cascavel	cognatus	conhado
castanea	castanha	cohŏrte	corte
castĕllum	castelo	collatiōne	colação

Latin	Portuguese	Latin	Portuguese
collīna	colina	cornūtus	cornudo
collecta	colheita	corōna	coroa
colōre	cor	corrĭgia	corveia
colŭbra	cobra	corrugus	corrego
comestiōne	comichao	cortĭcea	corteça
comĭtísa	condessa	cortīna	cortina
commater	comadre	costatum	costado
commīsum	comiso	cortùrnīce	codorniz
companiōne	companhào	creatūra	criatura
compater	compadre	credencia	creença
cŏmpŭtus	conto	crepatūra	quebradura
concĭlium	concelho	crustosus	crustoso
conclausum	conchouso	cŭbīle	covil
condŭctum	condoito	cŭcŭla	cógula
consŏger	consogro	culcĭta	colcha
constipātus	constipado	cultĕllus	cutello
consŭtūra	costura	cŭmŭlus	combro
contractus	contreito	cŭnĭcŭlus	coelho
contrarius	contrario	cŭrcŭlio	gorgulho
contrāta	contrada	cŭrsorius	cossouro
convenium	convenio	cuscŭlium	cascolho
conventus	convento	cycĭnus	cisne
cooperĭmĕntum	cobrimento	debĭtōre	devedor
copŭla	cobra	decania	deganha
cocīna	cozinha	decĕmber	dezembro
corbĭcŭla	corbelha	dinarius	dinheiro
corbīta	corveta	denŏtātus	dentado

Latin	Portuguese	Latin	Portuguese
diusanus	jusante	filancia	filança
desedium	desejo	filiatin	fiadin
desĕrtus	deserto	filiaster	filhastro
despectus	despeito	flebĭlis	febre
diacŏnus	diago	focāris	fogueira
digĭtāle	dedal	fucīlis	fuzil
diluvium	diluvio	fŏliātus	folhado
domĭna	dona	fŏliōsus	folhoso
ducātus	ducado	follĭcŭlus	folhelo
durĭtia	dureza	formīca	formiga
emplastrum	emplastro	formosus	formoso
episcŏpus	bispo	frictūra	fritura
escariola	escarol	frīgĭdus	frío
exāmen	esame	frĭscūra	frescura
exceptis	exetes	frondōsus	frondoso
facĕnda	fazenda	frontāle	frontal
factiōne	fazão	fumarium	fumeiro
factisius	feitiço	fumōsus	fumoso
facŭla	falha	fundamentum	fundamento
falcōne	falcão	furcĭlla	forquilha
fallĭta	falta	furnarius	forneira
farīna	farinha	fŭrŭncŭlus	foroncho
fenĕstra	frestra	gabella	gavela
fermentum	formento	galerna	galerna
forrarius	ferreiro	gallĭcus	galdo
fibĕlla	fivela	gallīna	galinha
fidelĭtāte	fieldade	gallinaceus	galinhaça

Latin	Portuguese	Latin	Portuguese
germānus	irmao	īndīcum	índigo
germāna	irmã	infante	infante
gerŭla	jerva	infĕrnum	inferno
gĭngīva	gengiva	infestus	enfesto
globellus	novello	ĭnfĭrmĭtāte	enfermedad
glŭtōne	glotao	inflatiōne	inchação
gracŭlus	gralha	infermus	enfermo
granarium	granel	ingennus	engeo
gúbĕrnum	governo	ĭnsĭpĭdus	encibido
habĭtacŭlum	bitácolo	ĭnsapīdus	enxabido
haerente	rente	insŭla	ilha
heredĭtarius	herdeiro	ĭntēger	enteiro
hibĕrnus	iverno	ĭnteranea	entranha
homicidium	omizio	ĭntermedium	tremenho
homĭnus	homen	ĭntertignium	entertinho
honōre	honor	ĭntroitus	entrudo
horologium	relogio	ĭntrosum	entrosa
horrōre	horror	ĭntybus	endivia
hŏspĭte	hóspede	ĭnvĕrsum	envez
hūmĕrus	hombro	ĭnvĭdia	enveja
hūtĭca	hucha	irātus	irado
imagĭne	imagem	januarium	janeiro
imbrĭcŭlus	brelho	jejūnus	jejum
imbūtus	embude	jocŭlāris	jogral
imperatōre	emperador	judaeus	judeo
ĭncensum	encenso	judīcium	juizo
indĭctum	endecha	jugŭlum	jugo

Latin	Portuguese	Latin	Portuguese
junctūra	juntura	lendĭne	lendea
juramentum	juramento	lenticŭla	lentilha
jŭvĕnis	jovem	lentiscus	lentisco
labōre	lavor	leprōsus	leproso
labrūsca	labrusca	lepŏre	lebre
lacertus	lagarto	levĭarius	ligeiro
lacrĭma	lágrima	levĭtum	lêvedo
lacūna	lagoa	libella	nivel
laesiōne	aleijão	licīnium	lichino
lamprēda	lamprea	ligamentum	liamento
lancareius	lanceiro	lĭgnarius	lenheiro
lancĕa	lança	lĭgnūsus	lenhoso
lanterna	laterna	legŭla	legra
lapathĭum	lapaça	limĭte	linte
larĭdum	lardo	liminarius	limiar
larĭce	lárice	limĭtāre	lindar
latratus	ladrado	limōsus	limoso
laudĭtōre	loador	līmpĭdus	limpo
latĕrālis	ladraes	lĭnarius	lenheiro
latīnus	ladinho	lineōla	linhó
latrōne	ladrão	linteoleum	lençol
lavatorium	lavadouro	litania	ladainha
lavatūra	lavadura	littĕra	létera
lectiōne	leição	locālis	lugar
legālis	leal	lacosta	lagosta
legenda	lenda	lucīfer	luzeira
legūmen	legume	lŭmbrīcus	lombriga

Latin	Portuguese	Latin	Portuguese
lŭparius	lobeiro	marītus	marido
lŭrĭdus	lordo	marrŭbium	marroyo
lŭtōsus	lodoso	marsŭppa	marsopa
machĭna	máquina	martellum	martelo
macŭla	malha	martyrium	marteiro
magĭcus	meigo	mascŭlus	macho
magĭda	malga	mataxa	madeixa
majestāte	majestade	materia	madeira
majōre	maor	matraster	madrastra
malandria	malandres	matrīna	madrinha
malfeactoria	malfeitoria	matrĭsĭlva	madreselva
malīgnus	maligno	matrōna	matroa
mallĕus	malho	malticinum	maceira
manĭcĭpo	mancebo	matūrus	maduro
manĭbella	manivella	medĭmus	meião
manĭca	manga	medietāte	mitade
manĭcus	mango	medŭlla	miola
manŭpŭlus	manolho	melanchōlia	menencoria
mantaica	manteiga	melĭmelum	marmelo
mantēles	mantaes	mellacium	melaço
mantĕllum	mantilla	memoria	memoria
manuālis	manoal	mendīcus	mendinho
manuarius	maneira	mesūra	mesura
marcŭlus	macho	mentastum	mentastra
margarīta	margarita	mentitōre	mentidor
margĭne	margem	mercātus	mercado
marīnus	marinho	merĕnda	merenda

Latin	Portuguese	Latin	Portuguese
merŭla	melro	murēna	mureia
nespĭlus	néspera	musaranea	musaranha
miliaria	milheira	mustiōne	muchõe
ministerim	mester	mutĭliōne	modelhão
mĭnōre	menor	myrtīnus	mortinho
mĭnūtias	minuças	nasturcium	mastruço
mĭnūtus	miudo	natatōre	nadador
merabīlia	maravilha	natēca	natega
miracŭlum	milagro	natiōne	nação
mesĕllus	mesello	navīgim	navío
mĭxtīcĭus	mestiço	nebŭla	névoa
mixtūra	mistura	necromancia	nigromancia
modŭlus	molde	nepēta	neveda
molinarius	moleiro	nibŭlus	nebri
mŭlīna	moinha	nigella	nigella
mollĭtia	molleza	nigellus	nigello
manŭcŭlus	monge	nĭtĭdus	nédeo
monastarium	mosteiro	nĭvōsus	nevoso
montanea	montanha	noctivŏlus	noitibó
monumentum	monumento	novacŭla	navalha
mordacia	mordaça	novāle	noval
mortālis	mortal	novellus	novel
mortalitāte	morteidade	novĕmber	novembre
mortarium	morteiro	novīcius	noviço
mortĭcīnus	mortezinho	nubĭlis	nubio
mŭcōsus	moncoso	nŭcālis	nogal
murcĭdus	murcho	nŭcārius	nogeira

Latin	Portuguese	Latin	Portuguese
oblata	obreia	parămus	páramo
obscurĭtāte	escuridade	parentātus	parentado
obscūrus	escuro	parĭcŭla	parelha
obsidium	assedio	parĭcŭlus	parelho
octavus	oitavo	parrŏchus	párroco
october	outobre	parrĭcus	parque
ocŭlus	olho	parvŭlus	parvo
olīva	oliva	pastellum	pastel
olīvus	olivo	pastōre	pastor
opĕra	obra	patraster	padrastro
opiniōne	opinião	patrōnus	padrão
oracŭlum	orago	pavimentum	pavimento
ordíne	ordem	pavōre	pavor
ovĭcŭla	ovelha	peccatum	pecado
ovīle	ovil	peccarius	pegueiro
pagānus	pagão	pectĭncŭlus	pentelho
palatīmus	paladim	pedāle	peal
pallĭdus	pálido	pedĭtum	peido
pallōre	bolor	pedōne	pedão
pampĭnus	pampano	pedŭcŭlus	piolho
panarīcium	panariz	pellāmen	pelame
panarium	paneiro	pellarius	pelleiro
pandora	bandora	perfectus	perfeito
panellus	painel	pergamīnum	pergaminho
papiliōne	pavilhão	pericŭlum	perigo
parabŭla	palavra	persōna	pessoa
paradīsus	paraíso	pertĭca	percha

Latin	Portuguese	Latin	Portuguese
pestellum	pestilo	proxĭmo	próximo
petrarium	pedreiro	publĭcus	pruvico
pigmentum	pimenta	pugnāle	punhal
pĭgrĭtia	preguiça	pulējum	poejo
pĭlōsus	peldoso	pulĭce	pulga
pinētum	pinhedo	pŭlpōsus	polposo
pĭnnacŭlum	penacho	purĭtāte	puredade
pĭscarius	pesqueiro	pustella	pastela
pĭscatōre	pescador	pŭtatōre	podador
pĭscōsus	pescoso	pŭtōne	podão
plumacium	chumaço	quadratus	quadrado
pluviōso	chuvoso	quaremonia	caramunha
portarius	porteiro	quaternus	caderno
portatōre	portador	quercīnus	cerquinho
postrarius	postreiro	rabiosus	raivoso
potestāte	podestade	racēmos	racemo
potiōne	poção	ramōsus	ramoso
practĭca	prática	rancōre	rancor
praebenda	prevenda	rapăno	rabão
praeposĭtus	preboste	rapistrum	labresto
presēpe	preseve	rastellus	restello
precaria	pregaria	rasūra	rasura
prmarius	primeiro	recisiōne	recisão
princĭpe	príncipe	recoctus	recoito
profectus	profeito	rectōre	reitor
proĭnde	porende	refertus	referto
propinquus	provinco	regālis	real

Latin	Portuguese	Latin	Portuguese
regestra	regestra	salĭce	souza
remulĭcum	reboque	salmaria	salmoura
renĭcus	rengo	salvītum	salvitre
resapium	resaibo	salŭbris	salobre
resīna	resina	salvatōre	salvador
retĭna	redeà	sanctĭtāte	santidade
rigĭdus	reigo	sanguĭneus	sanguinho
rogetione	rogações	sapĭdus	saibo
romāna	romana	sapōne	sabão
romanĭce	romance	sarcŭlum	sarcho
rosmarium	romaninho	sardīna	sardinha
rotŭlus	rolho	sarmentum	sarmento
rotŭndus	redondo	statione	sazão
rumōre	rumor	scabellum	escabello
runcīnus	rossim	scandăla	escandea
rŭptūra	rotura	scintilla	centelcha
sabbătum	sâbado	scopilia	escovilha
sabīna	sabina	scopŭlus	escolho
sabŭrra	saborra	escorpiōne	escorpião
sacrātum	sagrado	scriptūra	escritura
saecŭlum	sego	scutella	escudela
saetĭcium	sedaço	secūndus	segundo
sagĭtta	seta	secūris	seguro
sallĭcāre	salgar	sellarius	seleiro
salicetum	salzedo	sementis	semente
salīna	sainha	semĭta	senda
salīva	saiva	senāra	seara

Latin	Portuguese	Latin	Portuguese
septĭmana	semana	subtīlis	sutil
sarĭca	sarja	sucĭdus	sujo
sericŭla	sarilha	sucōsus	sucoso
serpĕnte	serpente	sudolento	souvento
serpŭllum	serpol	supercŭlus	sobejo
servacŭlum	servalho	sŭpernus	soborno
servitium	serviço	sŭpīnus	sobinho
sĭcĭtāte	sequedad	suspitiōne	suspição
salvatĭum	salvejem	tabānus	tabão
sĭngŭlus	sendos	taberna	taberna
sĭtŭla	selha	tabernarius	taberneiro
sobrīnus	sobrinho	tabŭla	táboa
solacium	solaz	tabŭlātum	taboato
solagĭne	soagem	talōne	talão
solĭtāte	saudade	tamarīce	tamariz
sorticŭla	sortilha	tamagnus	tamanho
specŭlum	espelho	tapitium	tapiz
spinōsus	espinhoso	tarantum	taranta
spirĭtus	espiritu	tardīvus	tardío
stavĭlis	estável	tartărum	tártago
stabŭlum	estabro	tegŭla	telha
stomăchu	estómago	tegŭlātum	telhado
strumento	estrumento	timōne	timão
strictu	estreito	tempestate	tempestade
subella	sovela	tenacŭlum	tenalha
subĭto	suto	tenāce	tenaz
subterraneus	soterráneo	tenerĭtia	terneza

Latin	Portuguese	Latin	Portuguese
tendōne	tendão	tramĭte	trámite
tenĕbrae	treva	tranvĕrsa	travessa
tesiōne	tesão	transvĕrsus	travesso
tentiōne	tenção	trecenti	trezentos
tepĭdus	tibio	tremacŭlum	tramalho
terebinthīna	termentina	trepestŭlāre	trebelhar
territorium	territorio	tribŭlum	trilho
tertiarius	terceiro	trimensis	tremes
tertialus	treçó	trepetia	trepeça
testimonium	testemunho	tristĭtia	tristeza
thalamus	tamo	trītĭcum	trigo
thesaurus	tesouro	todŭlus	tolho
tĭmōre	temor	tŭbīscus	trovisco
tinctūra	tintura	ūlĭce	urce
tineosum	tinhoso	ŭlmētum	olmedo
titiōne	tição	ŭmbīlĭcus	ombigo
tormentum	tormento	uncīnus	encinho
tomicia	tomiza	ūnctūra	untura
tosiōne	tosão	ŭndōsus	undoso
tomentum	tomento	ūngŭla	unha
torpēdo	torpedo	ŭrīna	ourina
tortiōne	torção	ŭrtīca	urtiga
toxĭcum	tóxico	vadōsus	vadoso
trabĭcŭlum	trabelho	vagabūndus	vagamundo
traditiōne	traição	vanĭtāre	vantar
tradĭtōre	traidor	venatōre	veador
tragŭla	tralha	verĭtāte	verdade

Latin	Portuguese	Latin	Portuguese
vermacŭlus	vermelha	vetŭlus	velho
versĭcus	vesgo	virgĭne	virgem
vervactum	barbeito		